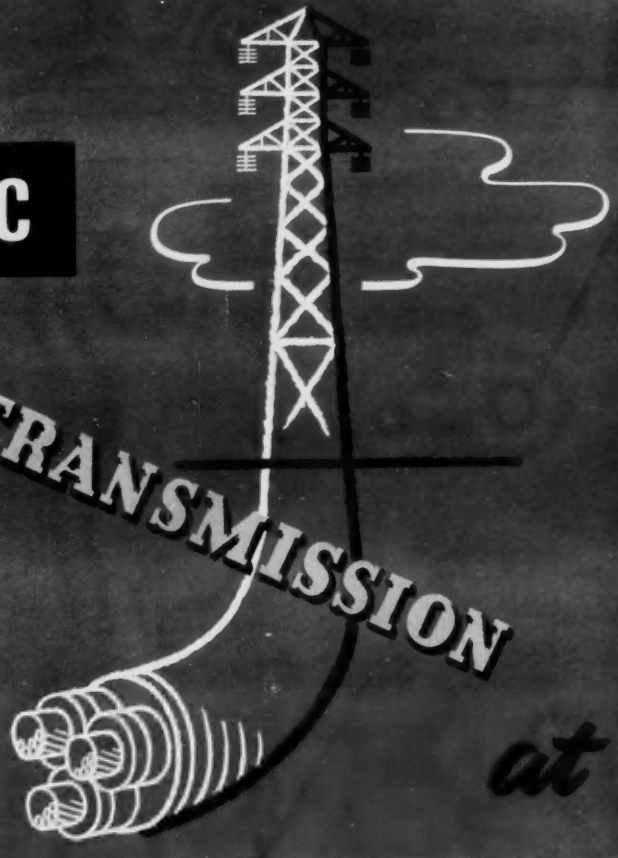
29 APRIL 1954 B.I.F. NUMBER NINEPENCE

ELECTRICAL TIMES

BICC



TRANSMISSION at OWEN FALLS

Consulting Engineers: Kennedy & Donkin and Sir Alexander Gibb & Partners

The many miles of power distribution and control cables required for the first four generators at Owen Falls have been supplied and installed by the BICC Group.

First 132kV Overhead Line in East Africa

One hundred and twenty route miles of 132kV overhead line are being erected by the same organization to carry power to Tororo and Kampala — the first 132kV overhead transmission line in East Africa.

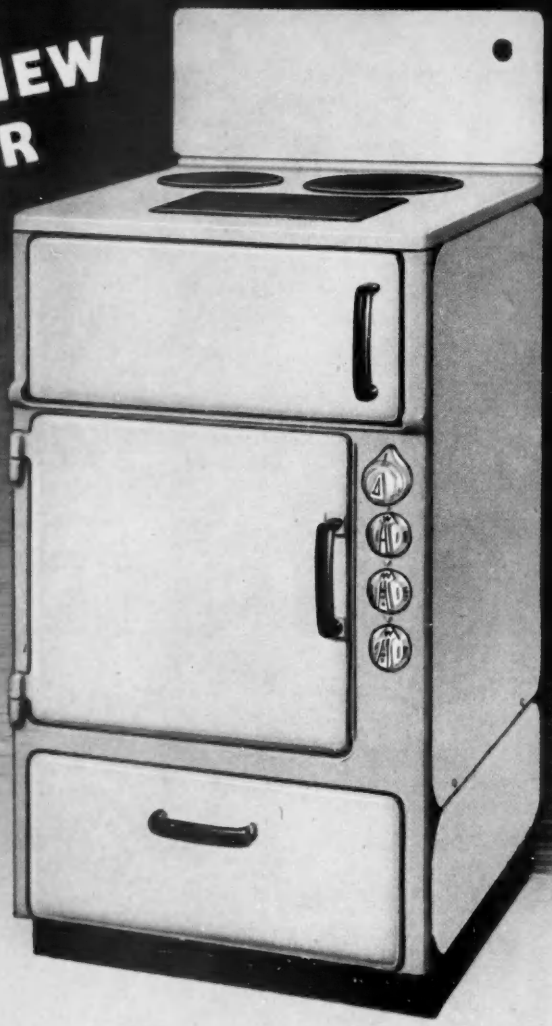
This contract for the Uganda Electricity Board is typical of the work carried out by the BICC Group in power transmission and distribution, in many parts of the World.

BRITISH INSULATED CALLENDER'S CABLES LIMITED, 21 BLOOMSBURY STREET, LONDON, W.C.1

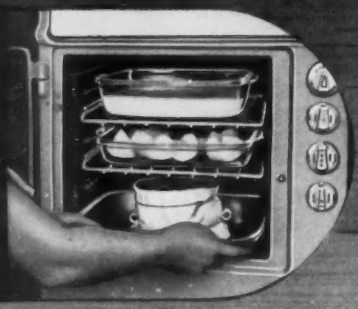
B N E

MODEL C.51

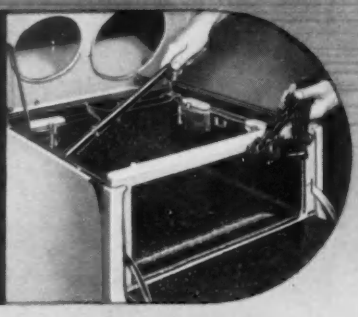
AN OUTSTANDING NEW LOW COST COOKER



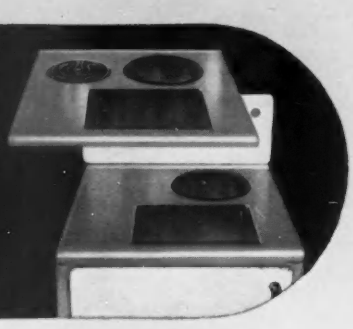
A full-size oven (2,600 cub. ins. actual cooking space) makes the C. 51 suitable for all but the largest of families.



The hotcupboard gives ample warming space, and is designed for easy cleaning.



Interchangeable 2-plate and 3-plate hobs mean that only one type of cooker need be stocked. Ideal for housing authorities.



The B.N.E. Model C.51 has the looks of a de-luxe cooker yet sells at a price that suits the mass market. With its large oven and hotcupboard, useful storage drawer, and interchangeable 2-plate and 3-plate hobs, the C.51 appeals both to the housewife and the housing authority.

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A Product of JOHNSON & PHILLIPS LTD.

BRITISH NATIONAL ELECTRICS LTD.

The Domestic Appliance Section of **JOHNSON & PHILLIPS LTD.**,

NEWARTHILL • MOTHERWELL • SCOTLAND

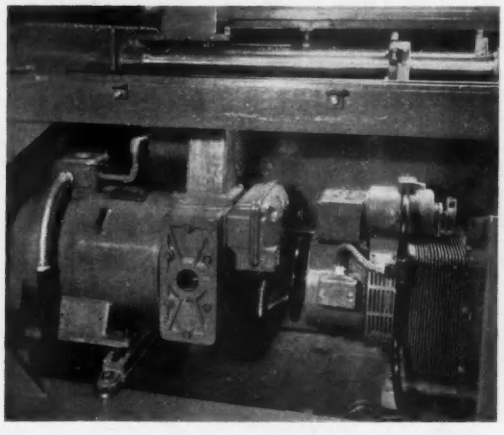
VARIABLE SPEED DRIVES BY L.S.E.

An increasing proportion of modern production machines and processes require efficient control of speed to ensure maximum quantity and quality of production and to make new manufacturing techniques possible. L.S.E., who have been serving industrial users of electric power for seventy years, can offer the correct type of motor for most variable speed drives, including the following standard machines:

THE N-S VARIABLE SPEED A.C. MOTOR

The N-S motor provides stepless speed adjustment within the designed range. Its speed is controlled by variable voltage from an induction regulator and its brushgear is fixed. Control may be direct by hand, from remote push-buttons or automatic. By means of automatic control the speed may be maintained constant at any pre-determined value or varied as required in accordance with tension, thickness or other measure of the product, speed of another machine, etc.

The N-S motor is made for outputs up to about 1,500 h.p. in various enclosures including totally-enclosed fan-cooled. Small machines are standardised and are available from stock.



Automatic control of this N-S motor driving a Beam Warping machine (Thos. Holt Ltd.) gives speed control to within ± 1% at a yarn speed of 500 yds per min. The speed range is 3:1 for beam build-up, with a further 2:1 range for linear speed variation.

SQUIRREL-CAGE MOTORS AS VARIABLE SPEED MACHINES

By the use of the N-S Speedmaster or Convertor, squirrel-cage motors may be used as variable speed machines or as multi-speed machines with almost any required ratio between different speeds.

The Speedmaster is applied to drives where the speed of a number of motors requires to be varied in unison, as in the case of variable speed roller tables and processing lines. The N-S Convertor is used to give a low speed without the need for gearing or motors with a large number of poles, and can provide a low speed step for a motor used normally at a considerably higher speed when connected to a 50 cycle supply.

In many instances the use of one or the other of these systems will ensure marked practical and economic advantages.

D.C. MOTORS

Where direct current is available the use of d.c. motors is often advantageous and conversion from a.c. to d.c. is occasionally justified. A d.c. motor can be designed to give almost any required speed/torque characteristic by field and/or voltage control, speed ranges of about 4:1 being obtainable with the former and up to 100:1 with the Ward-Leonard system.

Details of a number of variable speed applications are given in L.S.E. Engineering Bulletin, Vol. 3, Nos. 2 and 3, obtainable on request from:—

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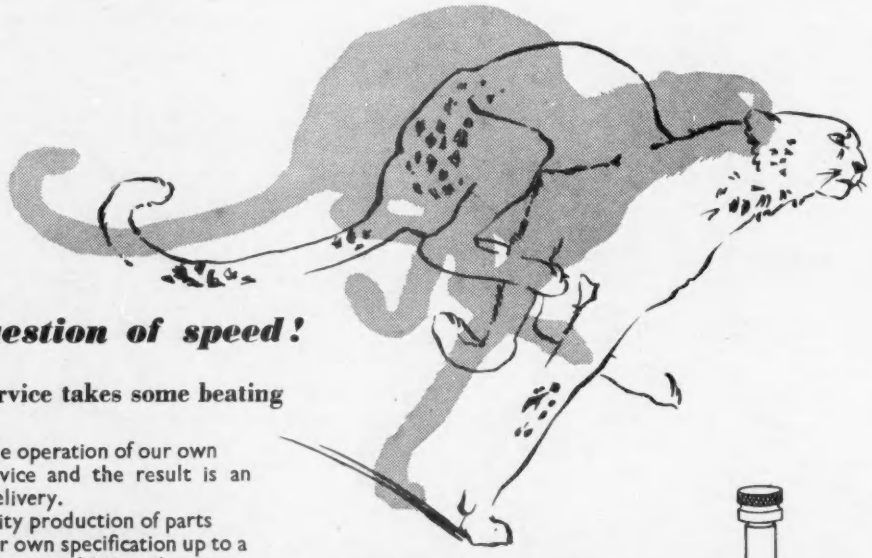

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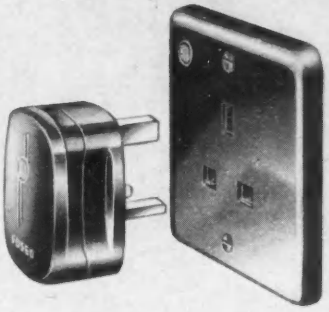

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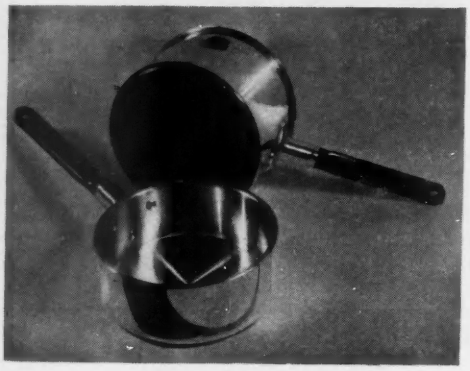
The reasons why *Pyramid* Black Ground Base utensils

Speed your Cooking...



It is well known that black surfaces absorb radiant heat faster than light or bright finishes which tend to reflect heat. The demand for quicker boiling times and consequently lower Electricity Bills has been met. After more than a year of experiments PYRAMID present the new BLACK GROUND BASE range of quality utensils for use on cookers which have both Radiant and Solid hot plates. Rapid boiling, functionally designed, and built to traditional PYRAMID QUALITY Standards, this new heat absorbing BLACK GROUND BASE Range will be indispensable to those women desiring maximum speed and efficiency from their cooker.

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Type of pan	Type of hotplate	Time in minutes and seconds			
		2 pts.	3 pts.	4 pts.	5 pts.
Light aluminium	1,600 watt radiant	8·42	11·25	13·05	15·30
Light aluminium	1,800 watt solid	10·02	11·55	14·25	17·50
Ground/black-base aluminium	1,600 watt radiant	7·28	10·03	11·45	14·16
Ground/black-base aluminium	1,800 watt solid	7·32	9·54	11·25	13·50

Our ability to meet your requirements and to build prestige through every sale is determined largely by our technical improvement policy; that is, the assistance we give you and your customers through our developments in utensil efficiency. Tested and proven, the new PYRAMID Black Ground Base utensils for electric cookers fitted with Radiant and Solid Plates are a very special part of that service, appealing quickly to a growing demand and building your sales through speed, efficiency and a reputation for leadership in the Development of Quality Utensils.

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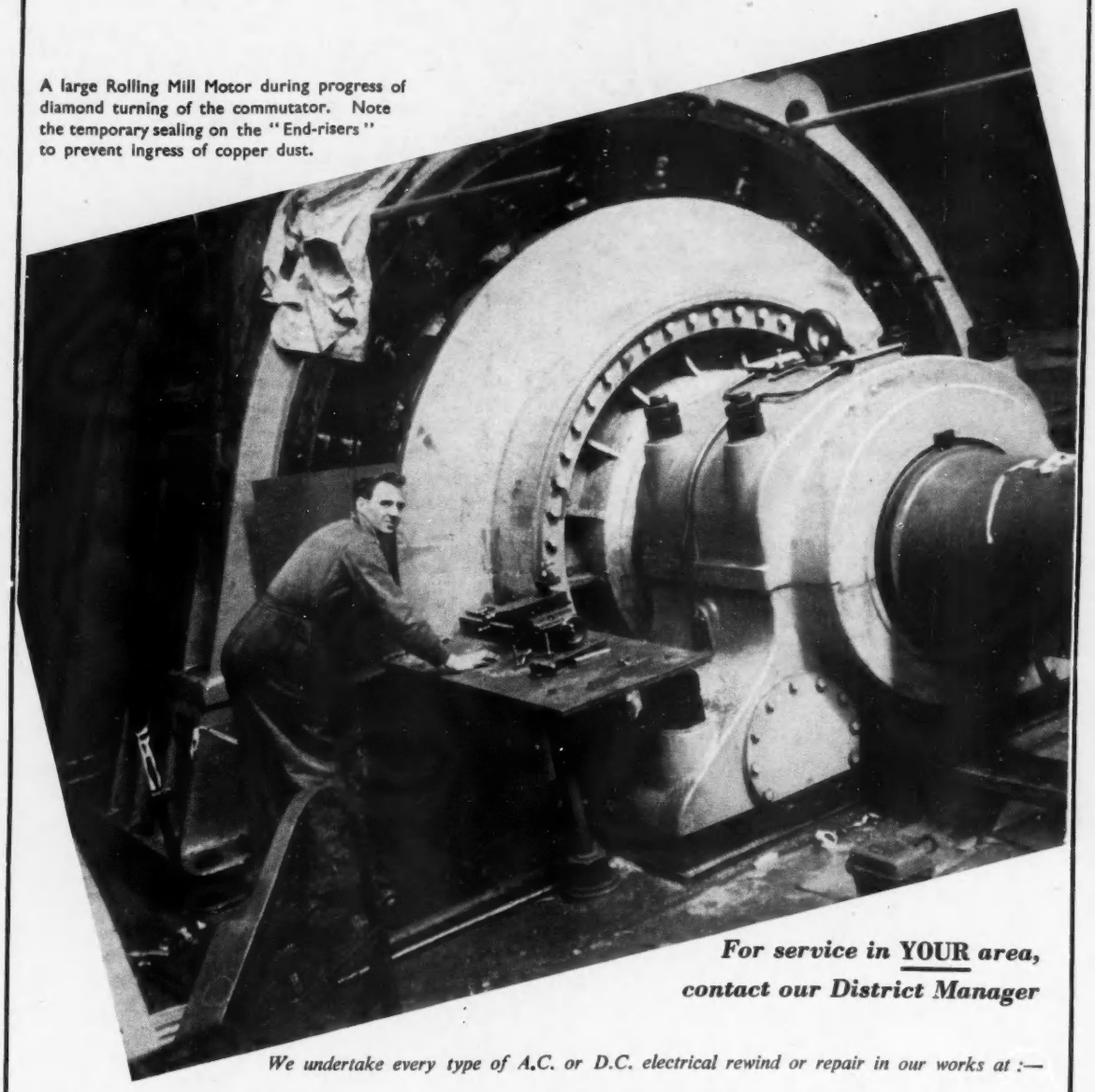
an example of site service given to users of large machines of this type

A large Rolling Mill Motor during progress of diamond turning of the commutator. Note the temporary sealing on the "End-risers" to prevent ingress of copper dust.



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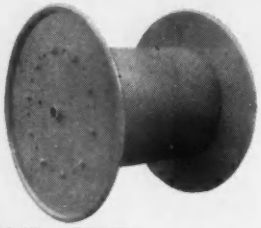

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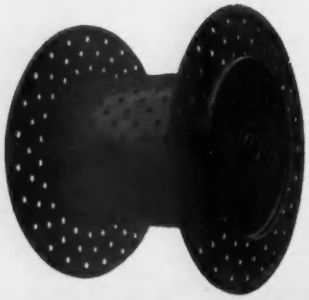

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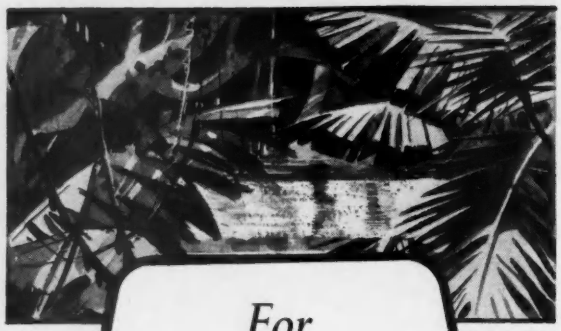

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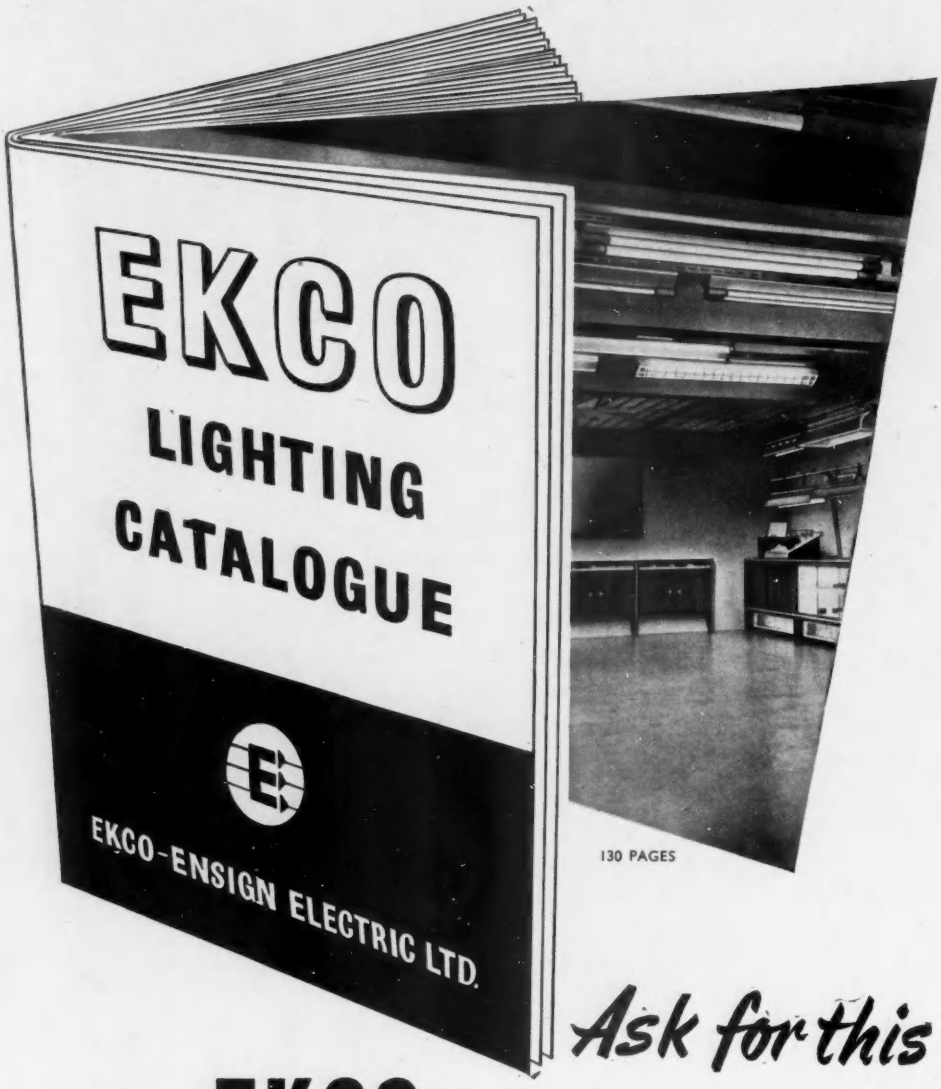

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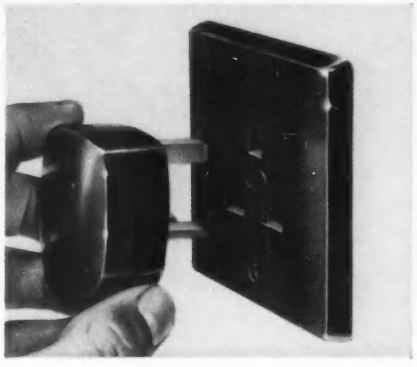

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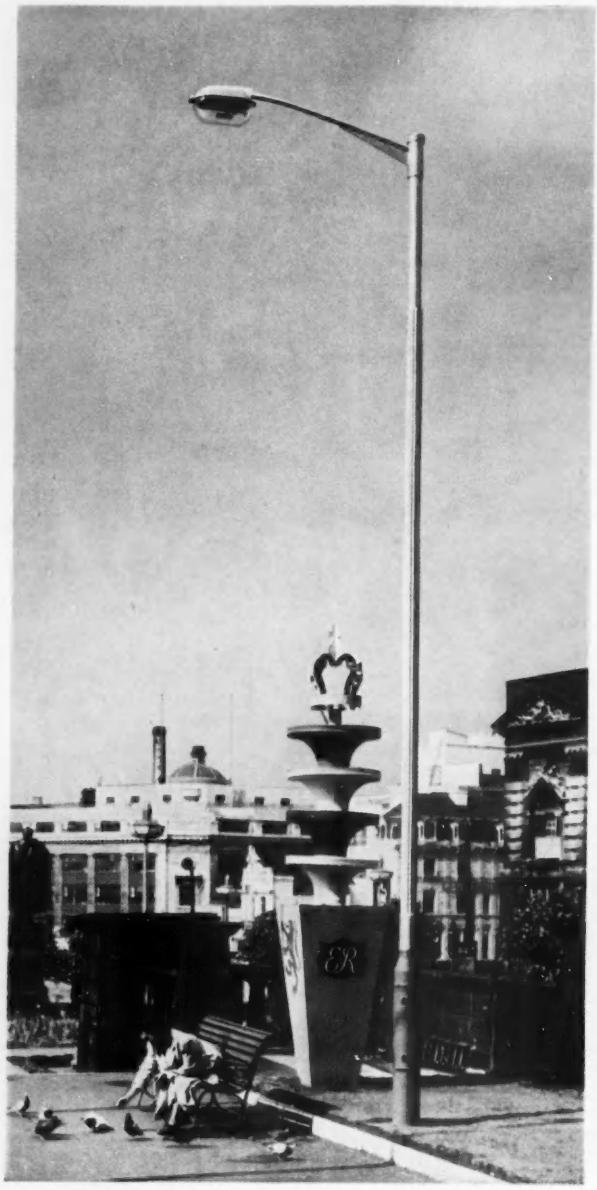

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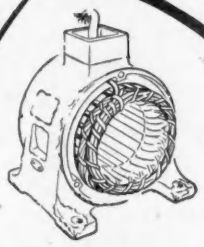

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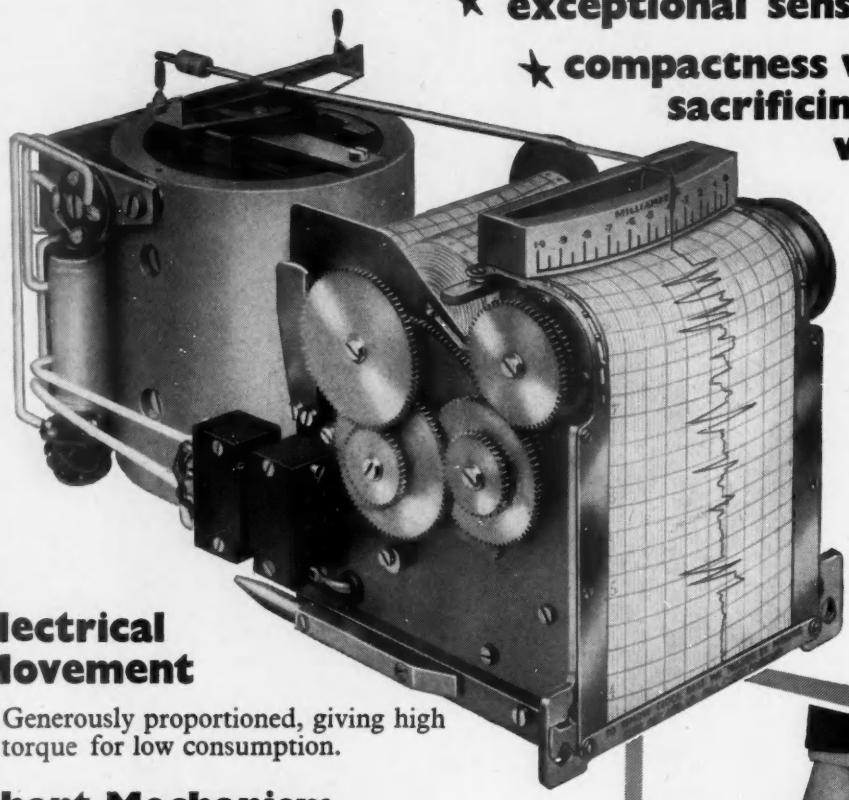

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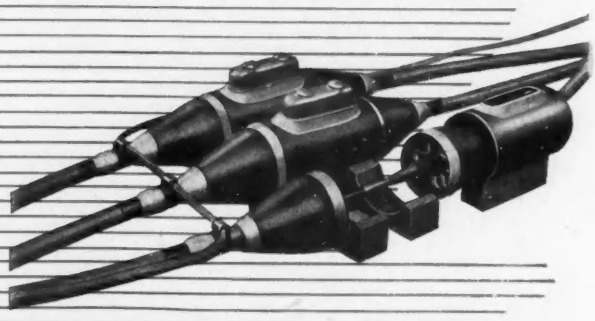

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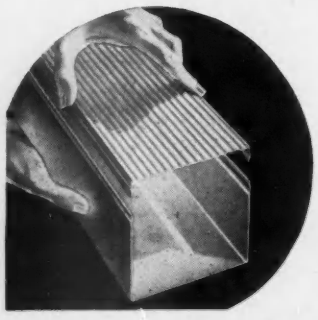

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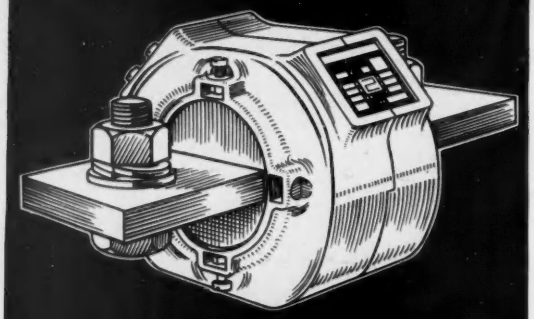

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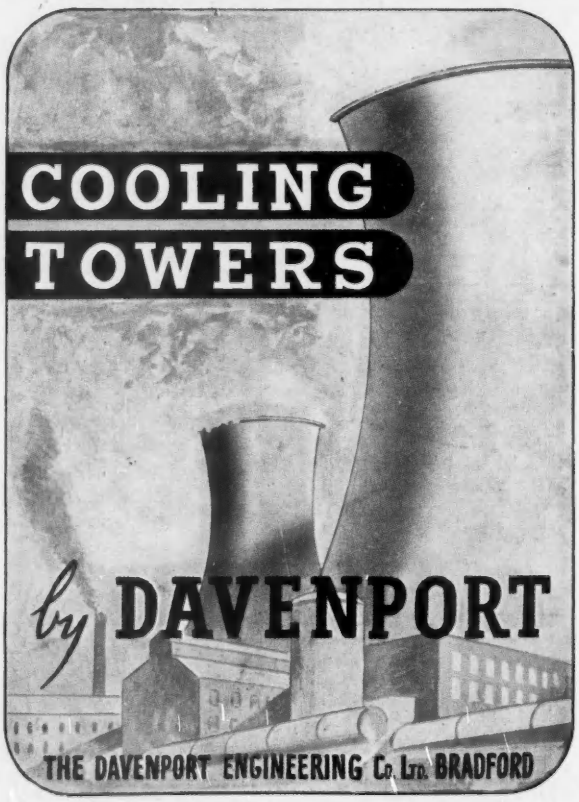

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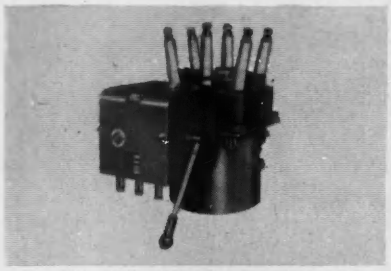
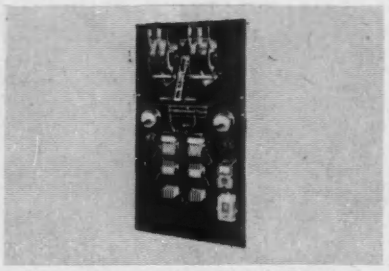
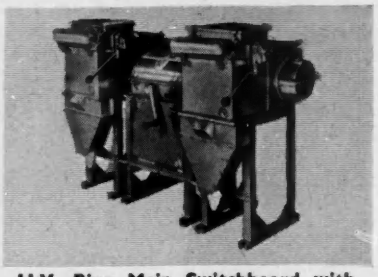


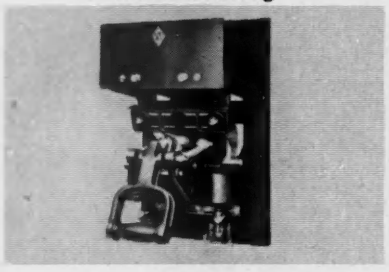
15 kV Oil Circuit Breaker for cubicle mounting



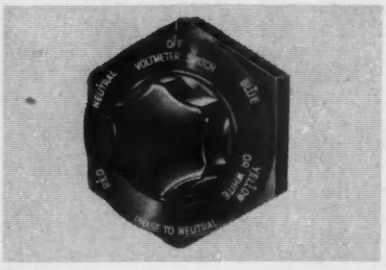
Heavy Current D.C. Circuit Breaker and Knife Switch Panel



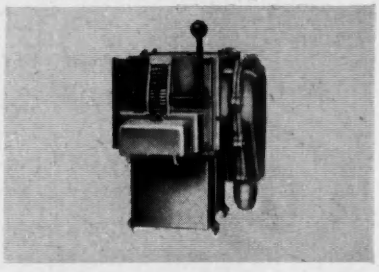
H.V. Ring Main Switchboard with Fuse Switch controlling Tee-Off



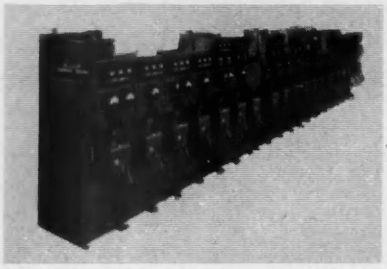
Small Air Circuit Breaker



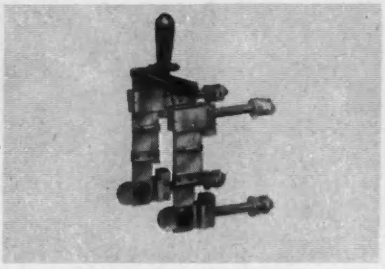
Ammeter and Voltmeter Switches



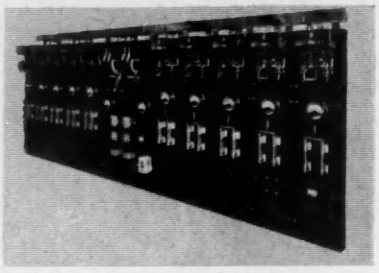
L.V. Industrial Oil Circuit Breaker



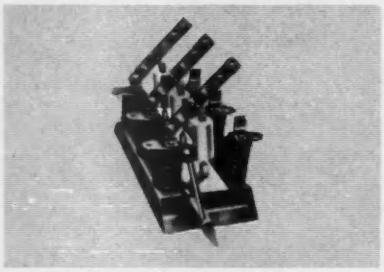
11 kV Metalclad Switchboard



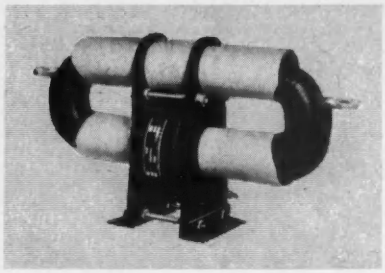
Panel Mounting Knife Switch



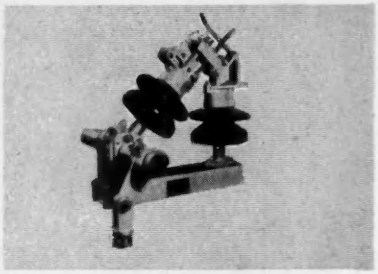
D.C. Switchboard for Steel Works



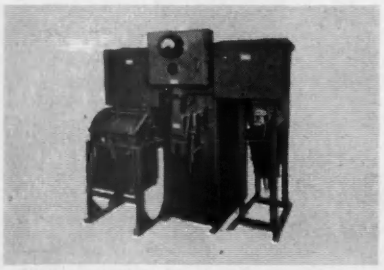
T.P. 11 kV Isolating Switch



Current Transformers



Outdoor Pole Mounting Isolators



H.V. Switchboard incorporating Automatic Fuse Switch

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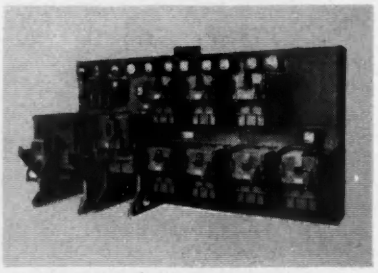

Industrial Switchboard with Drawout Oil Circuit Breakers

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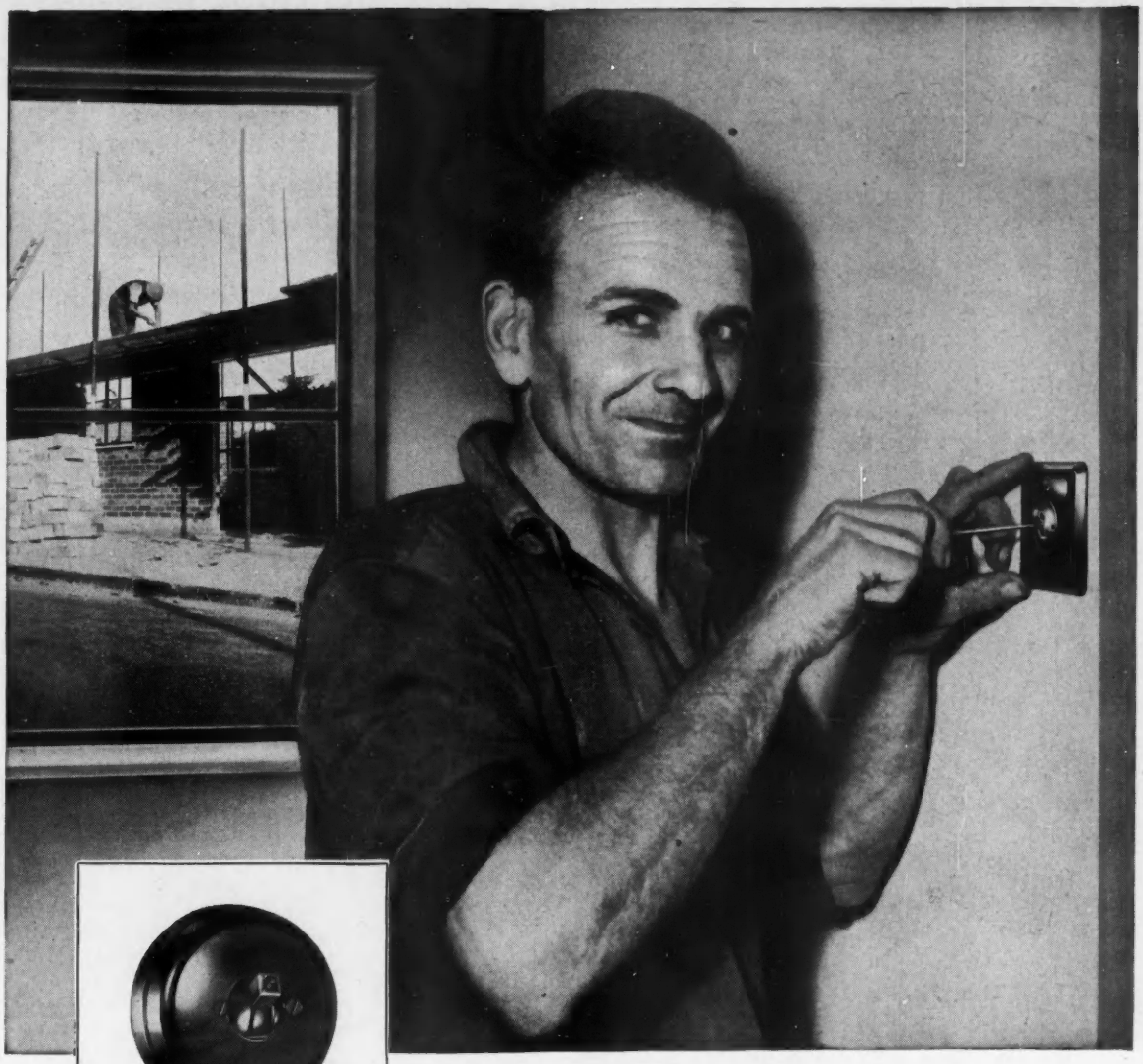

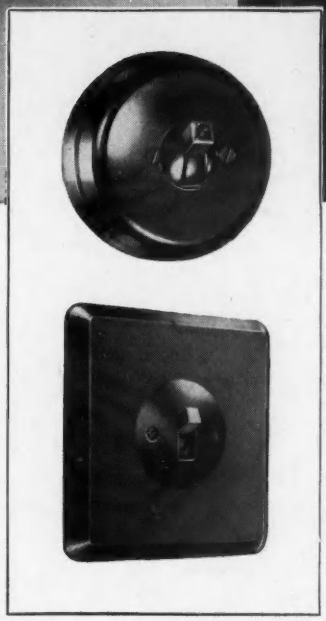

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Points like these mean a great deal to chaps like me. They also show that apart from producing a jolly good switch at a very competitive price Ediswan Designers have given quite a lot of thought to making them simple to install.

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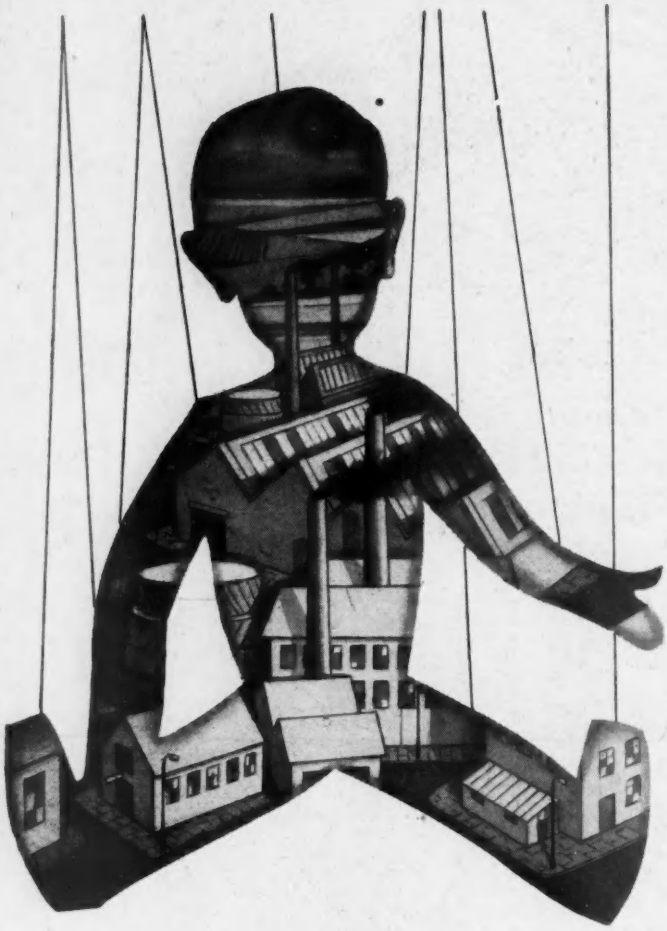

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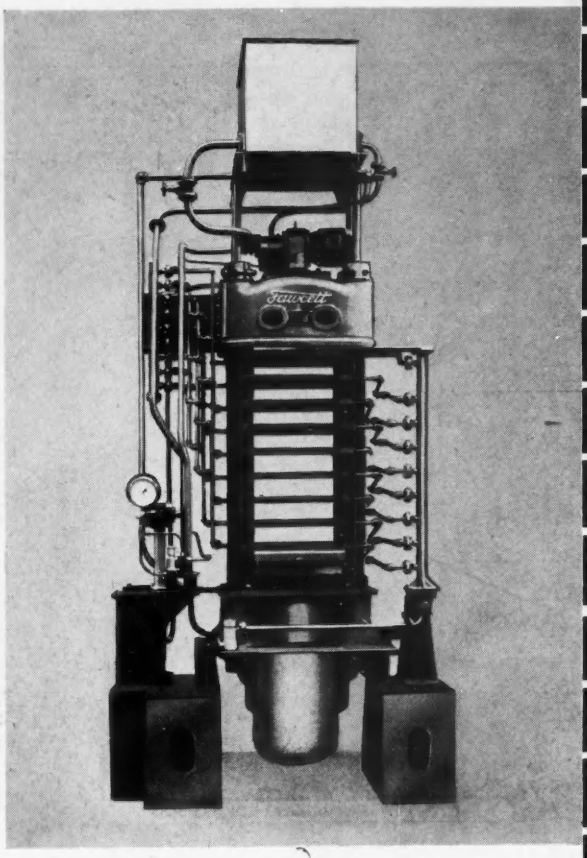
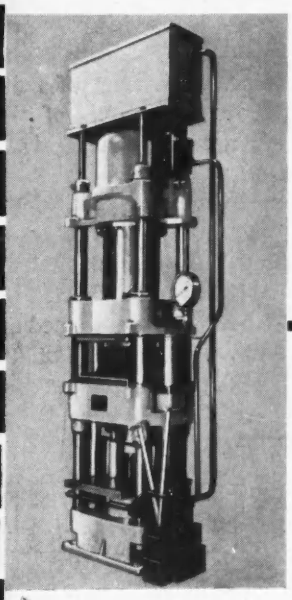


This 500-ton up-stroking Multi-Platen Press has a self-contained pump and oil reservoir mounted on top. Platens are arranged for alternate Steam Heating and water cooling.



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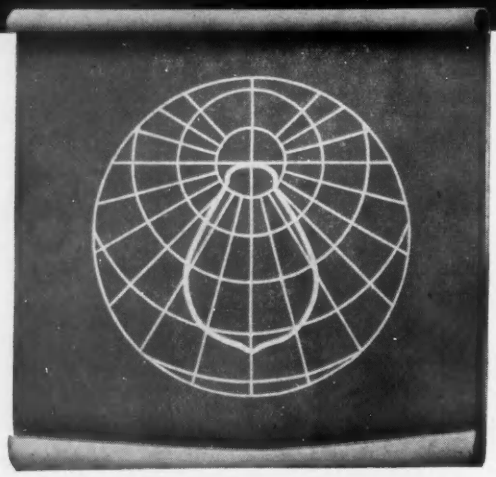

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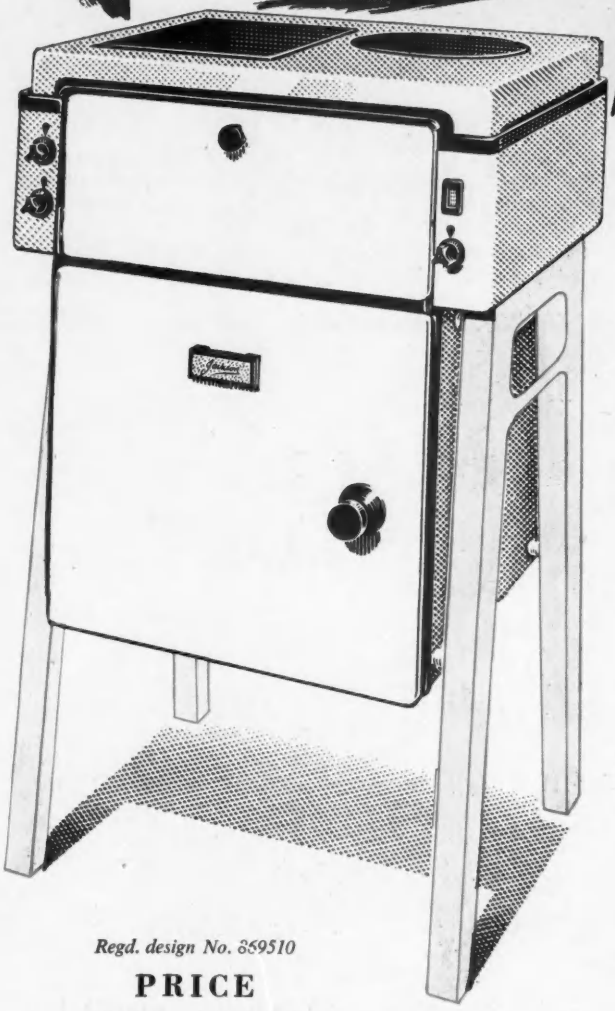

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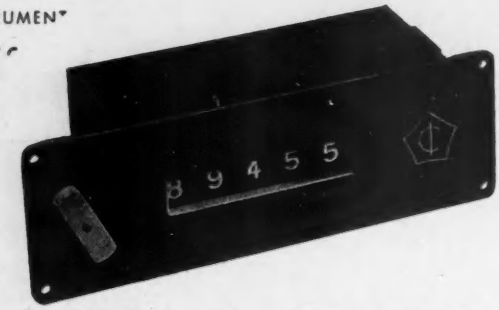

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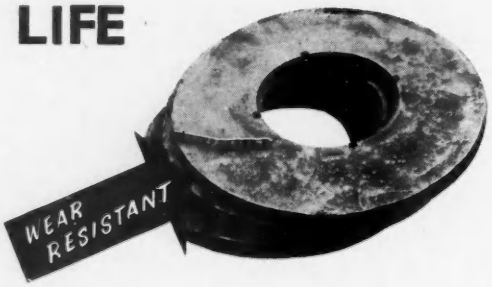

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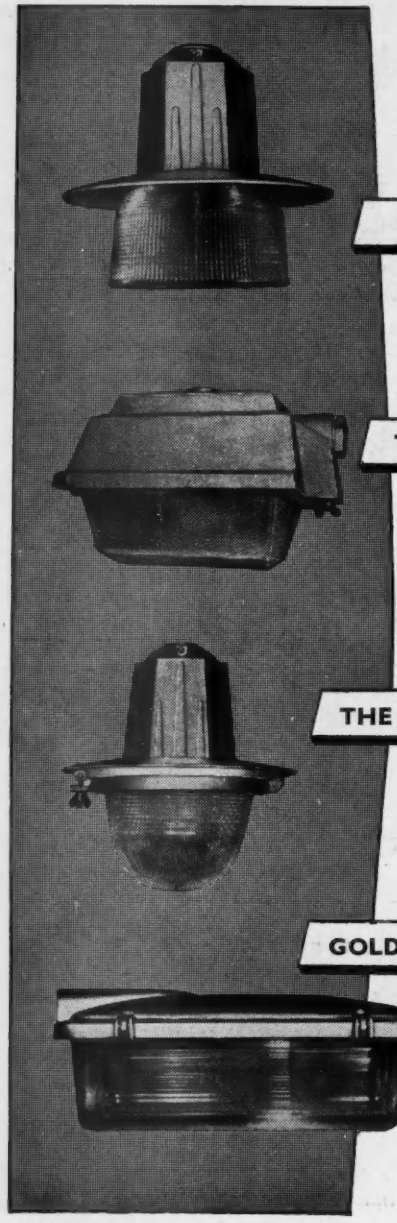

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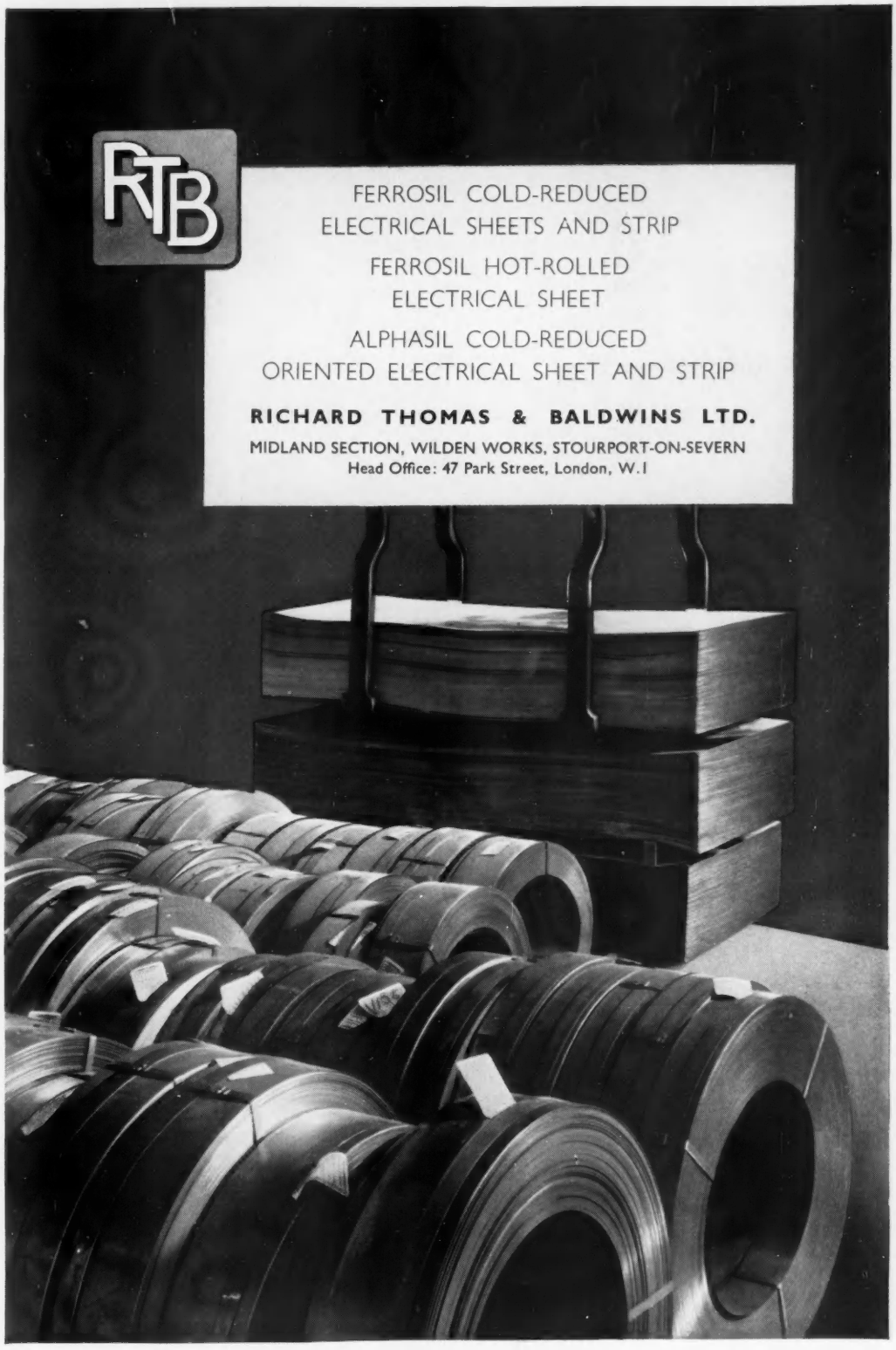
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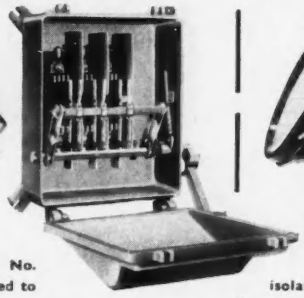
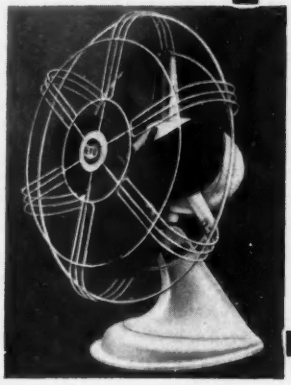
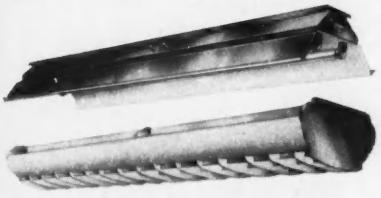


Typical of the range of Revo floodlights for tungsten, mercury or sodium lamps

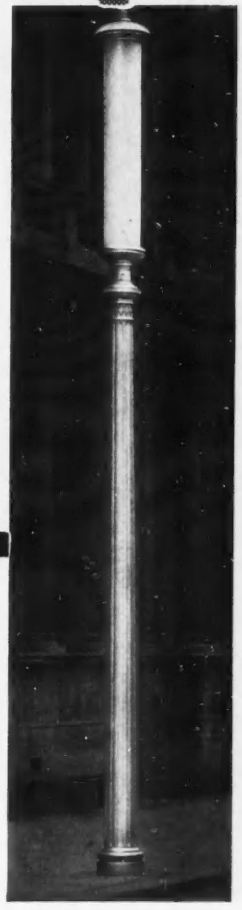
A heavy-duty isolating switch for industrial installations



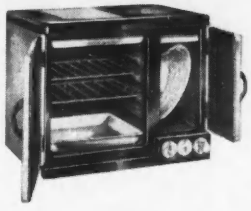


An industrial trough type reflector fitting, together with a decorative model, both using 4 ft or 5 ft. tubular fluorescent lamps

The Revo "Dolphin" electric fire in vitreous enamel with B.S.S. guard



The range of Revo electric fans includes models for desk, wall and ceiling mounting.



(left) The Revo "Peerless" cooker, designed for table use or with special stand, incorporates a roomy oven, plate warming compartment, grill-boiler and 8 boiling plate.

(right) This "Festival" fluorescent lantern and cast iron column is representative of the wide range of Revo street lighting equipment

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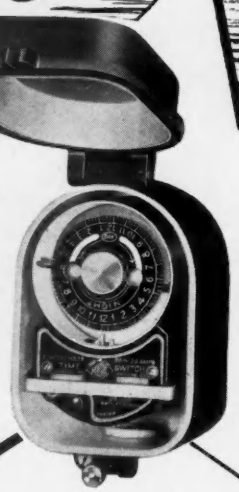
TIME SWITCHES



Type "V"

The comprehensive range covers hand wound models (15, 21 & 40 day run), electrically wound models and synchronous models with or without spring reserve, as required. Models are available for public lighting, off peak tariff and shop window lighting control, etc., etc.

Many years of experience in the design and manufacture of automatic lighting appliances ensures that HORSTMANN TIME SWITCHES meet the exacting demand of modern lighting control.

The illustrations show the type "V" 20 amp. and the type "Y" 20 amp. switches. The latter is electrically wound and incorporates a spring reserve. Its compact size makes it particularly suitable for use in the base of lamp columns where space is limited.

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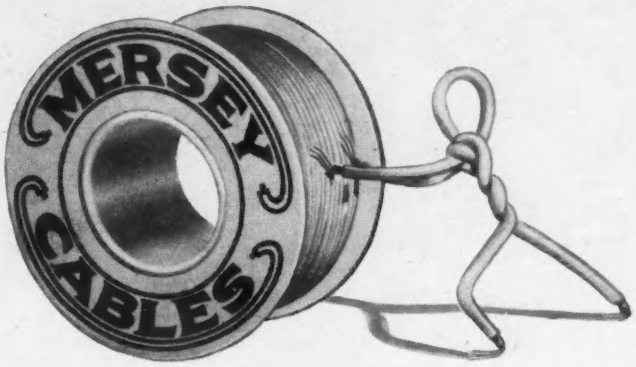

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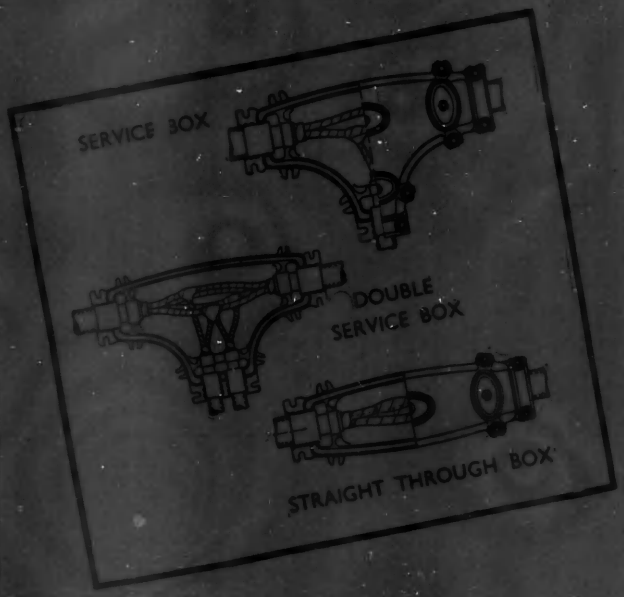

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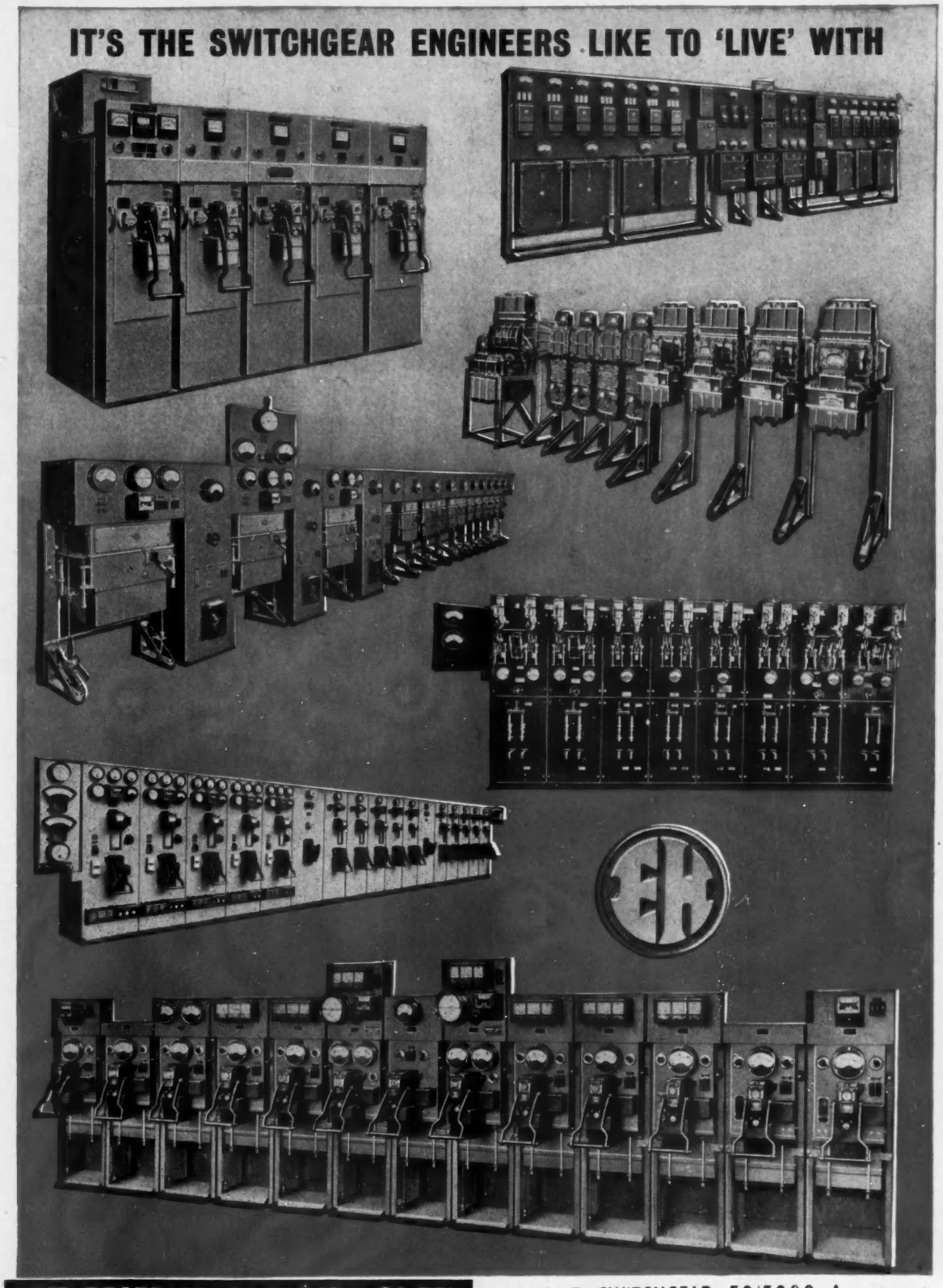

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MOTOR CONTROL GEAR 1/4/5000 H.P.

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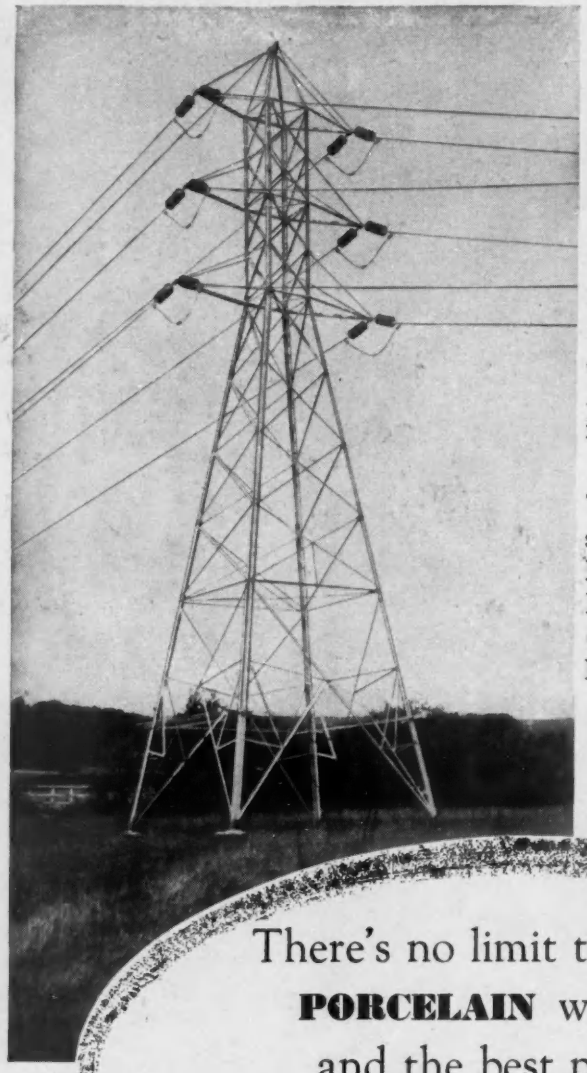

The photograph shows T.T. porcelain Cap and Pin Insulators on one of the first 66 kV Overhead Lines to be erected in the British Isles—a line from Maentwrog to Wrexham which is still in use after a quarter of a century.

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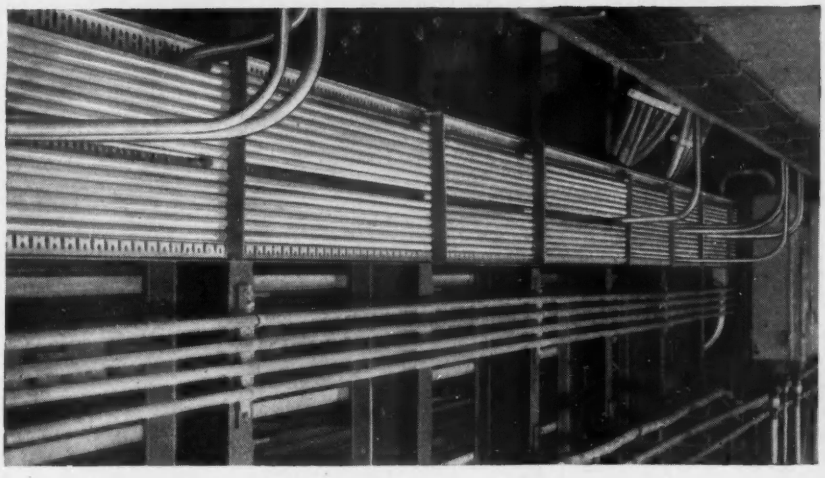
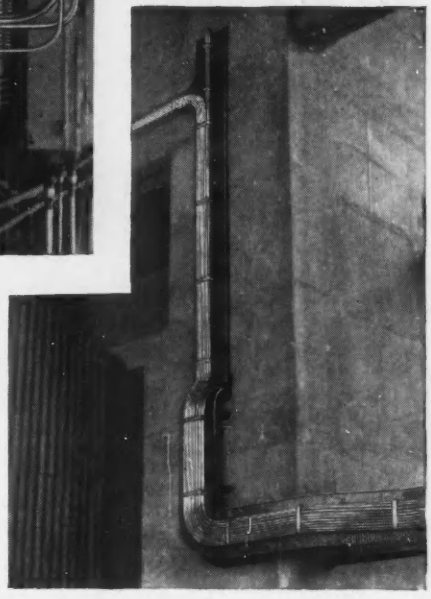
Photographs taken at Stourport 'B' Generating Station.

Consultants:
Messrs. Ewbank & Partners Ltd.



Above: A double bank of thirty J. & P. multi-core rubber insulated aluminium sheathed control cables.



Right: The ease of erection is well illustrated by this run of control cables mounted on perforated trays.

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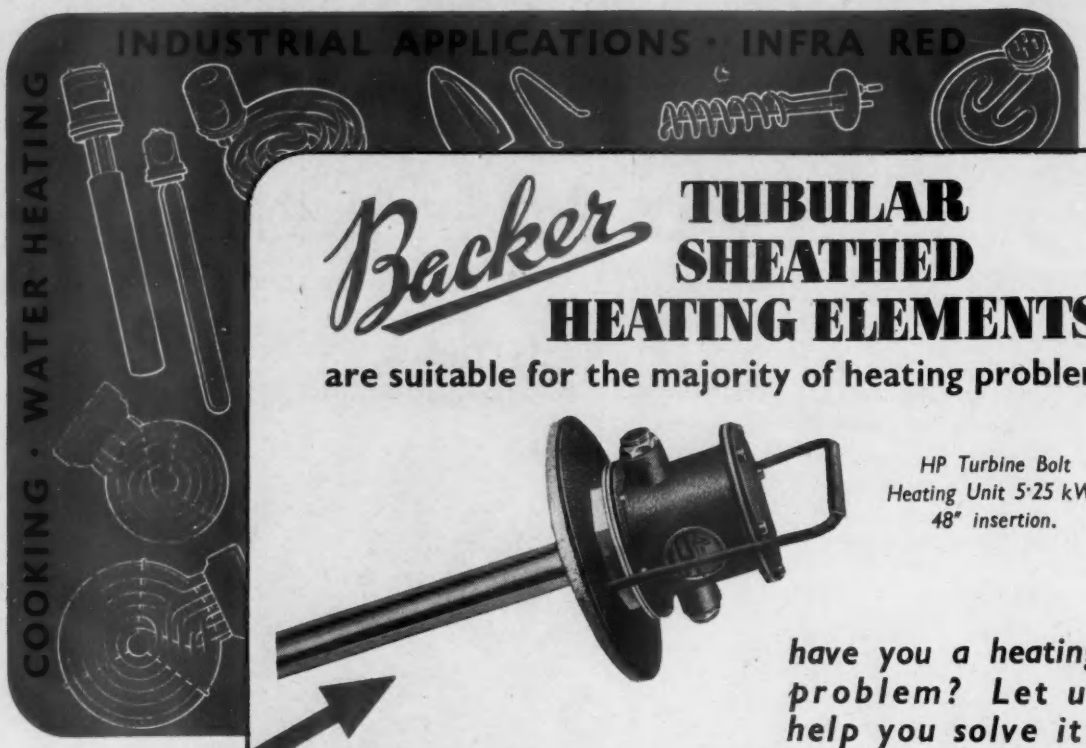
ELECTRICAL ENGINEERS AND CABLE MAKERS

★ *FIRST IN THE WORLD WITH ALUMINIUM SHEATHED CABLES*



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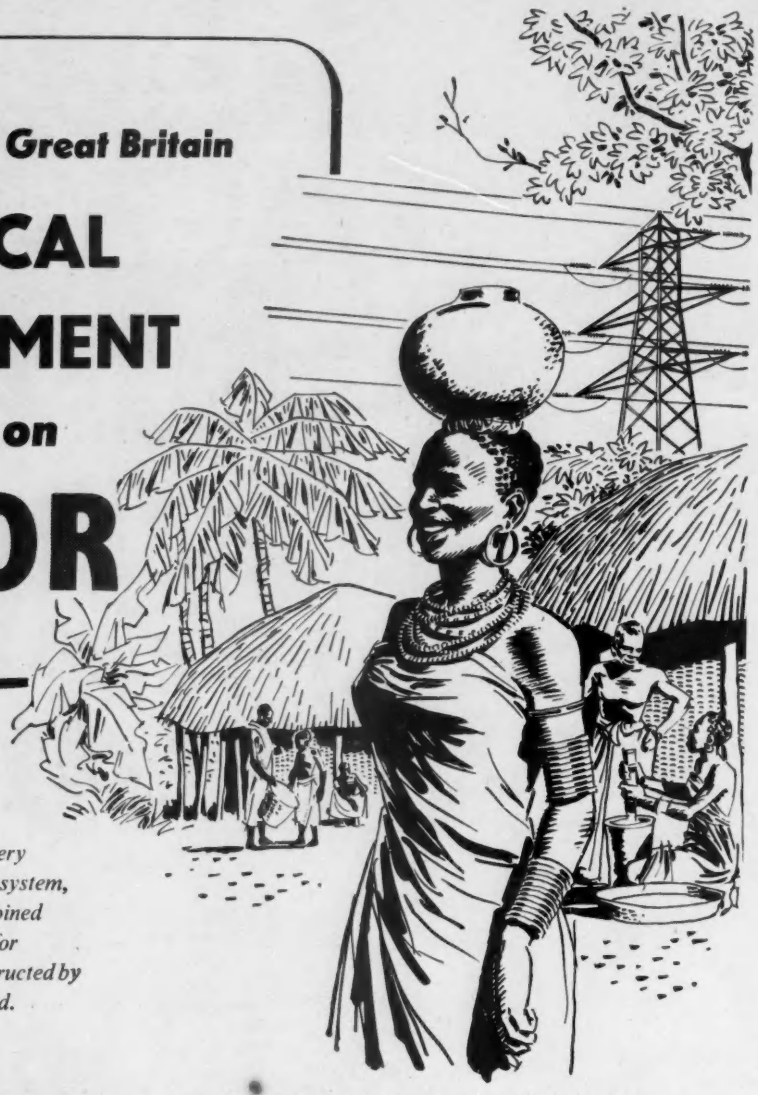

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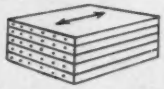
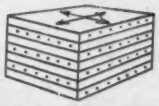
COMPARATIVE TABLE OF PROPERTIES GRADES 'EH' AND 'TH' PERMALI	Type 5		Type 6	
				
Property	*(Unidirectional)* *Grade 'TH'*	*Grade 'EH'*	*(Cross-laminated)* *Grade 'TH'*	*Grade 'EH'*
Bending Strength p.s.i.	28,000	28,000	14,000	14,000
Tensile Strength p.s.i.	25,000	28,000	12,000	14,000
Shear Strength p.s.i.				
∥ to grain and laminae... ...	2,300	2,300	—	—
∥ to grain ⊥ to laminae ...	4,300	4,300	—	—
⊥ to grain and laminae... ...	6,000	6,000	—	—
∥ to laminae	—	—	2,500	2,500
⊥ to laminae on laminated face	—	—	6,900	6,900
⊥ to laminae on an unlaminated face	—	—	5,300	5,300
Compressive Strength p.s.i.—				
⊥ to laminae	—	—	30,000	30,000
∥ to laminae	18,000	18,000	18,000	18,000
Water Absorption (BS 1137) ...	0·3% max.	1·2% av.	0·3% max.	1·2% av.
Specific Gravity	1·34	1·28	1·34	1·28
Electrical Puncture at 90° C. (BS 1137)	36 kV.	40 kV.	36 kV.	40 kV.
Electrical Breakdown ∥ to laminae at 90° C. (BS 1137)	28 kV.	28 kV.	28 kV.	28.kV.
Power Factor 50 cycles 20° C. ...	4%	2%	4%	2%
Impact Strength C1Z0D type test unnotched specimen ½" x ½":				
∥ to laminae	3·0 ft. lb.	4·5 ft. lb.	1·5 ft. lb.	2·0 ft. lb.
⊥ to laminae	4·0 ft. lb.	5·5 ft. lb.	2·5 ft. lb.	3·0 ft. lb.

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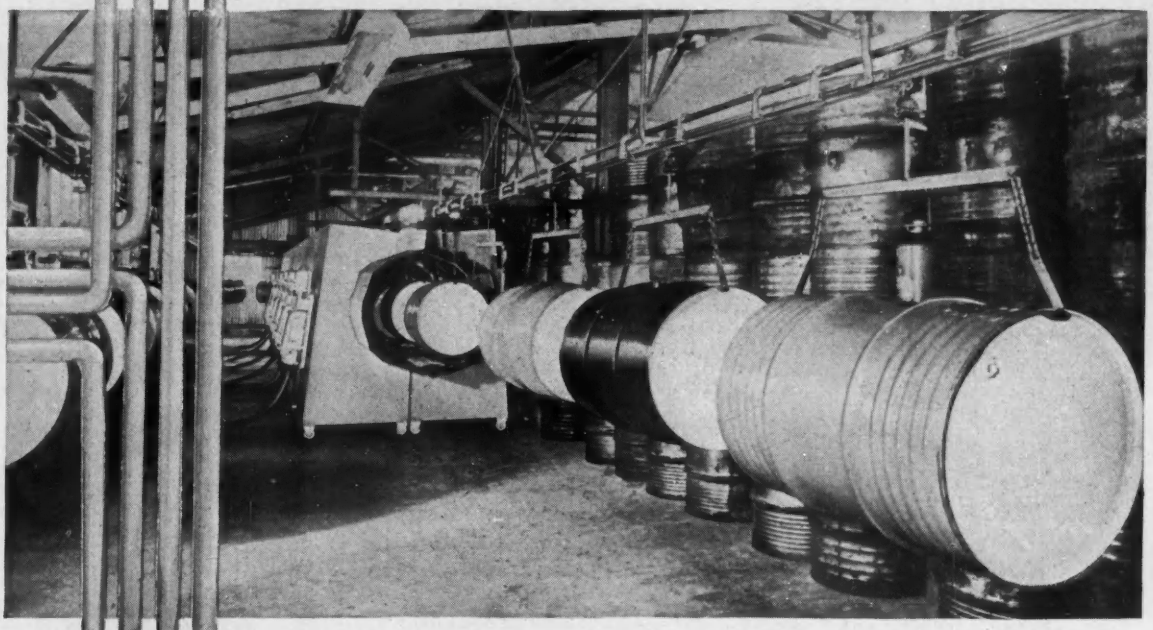

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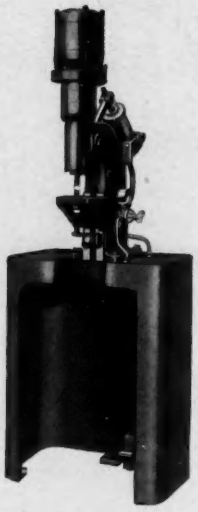

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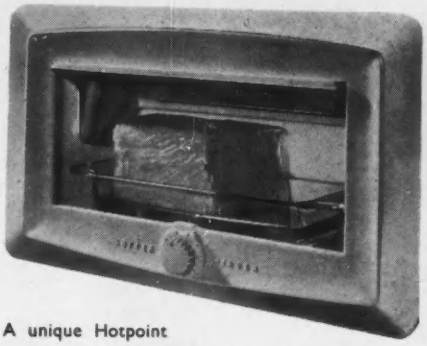

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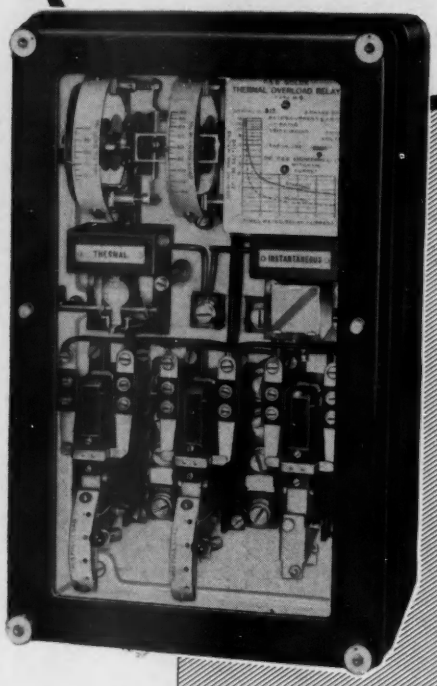

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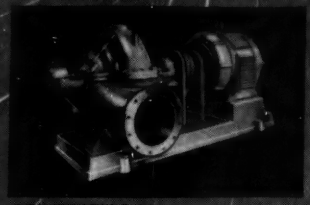

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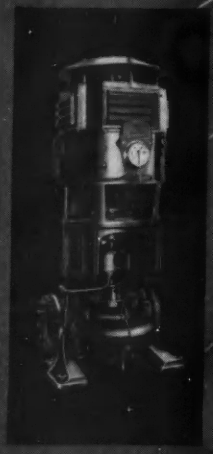
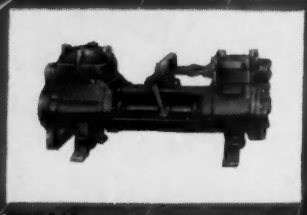
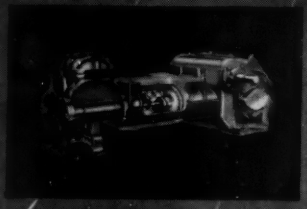


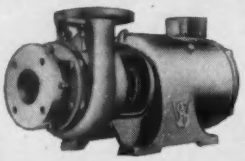
NUMARINE



STEAM



POWER



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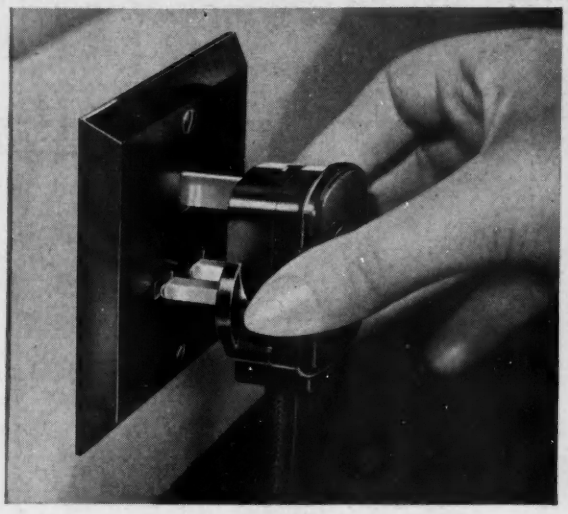

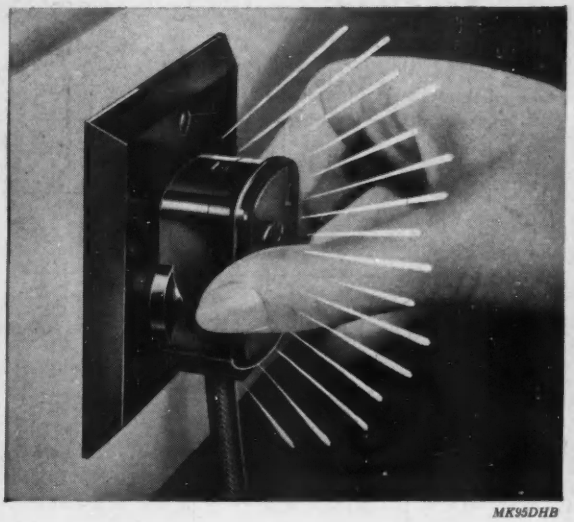

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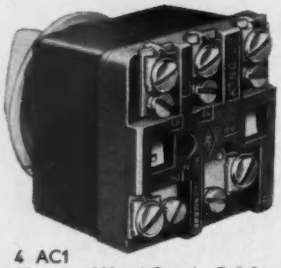

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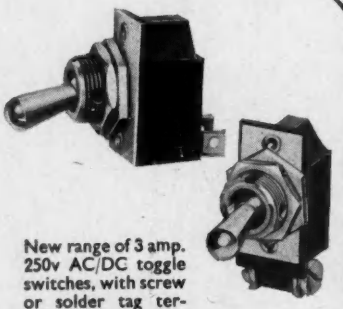
15 amp. 250v AC only D.P.3 heat rear wiring 1¾" deep. Designed to conform with European specifications.



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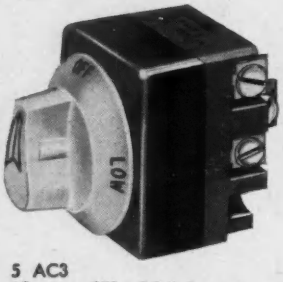

5 AC3
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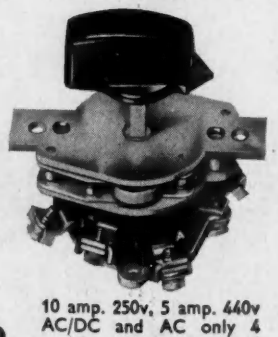

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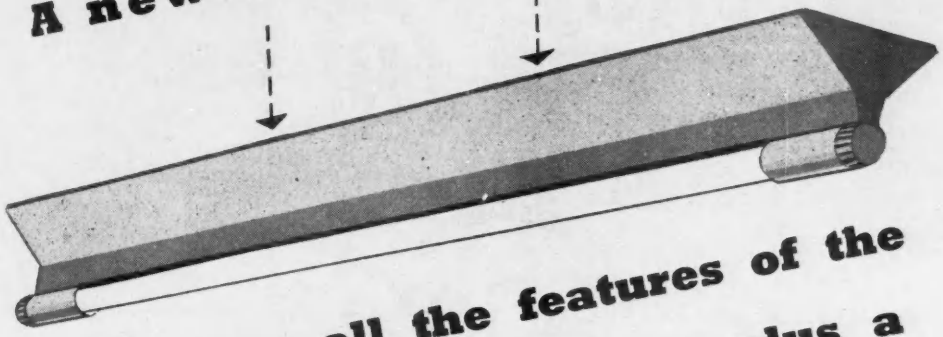
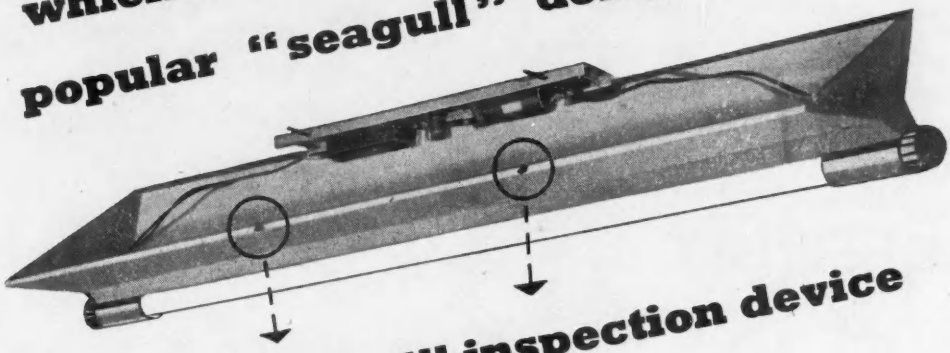


which has all the features of the popular "seagull" design plus a



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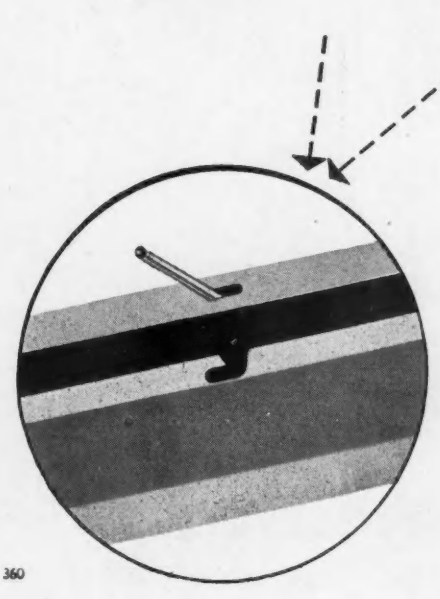

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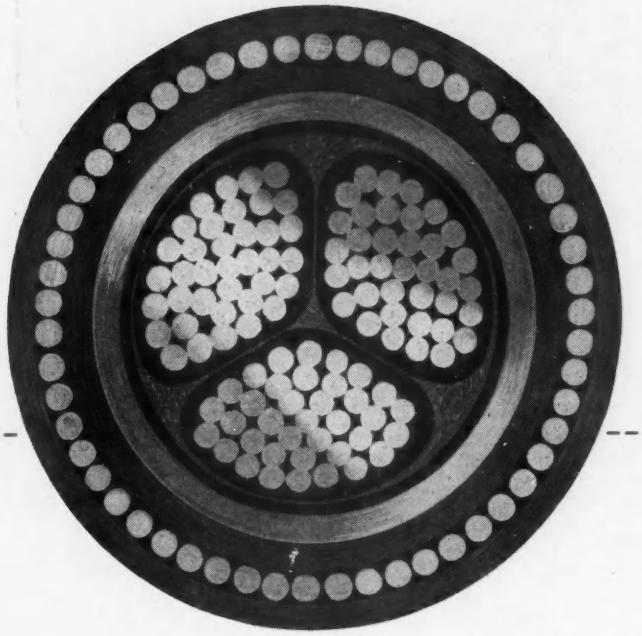

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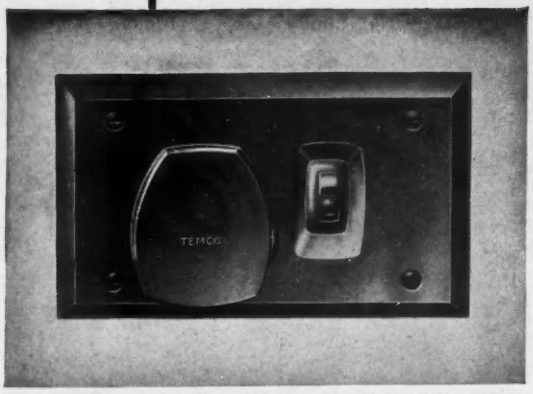

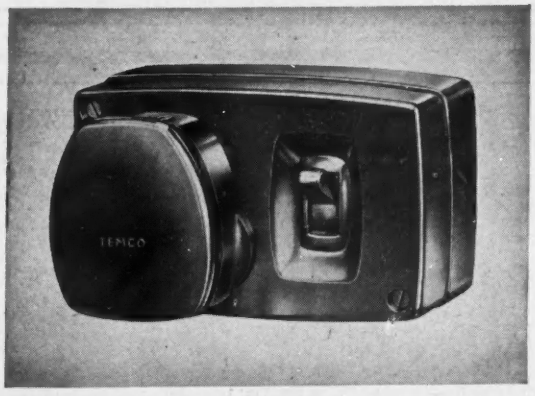

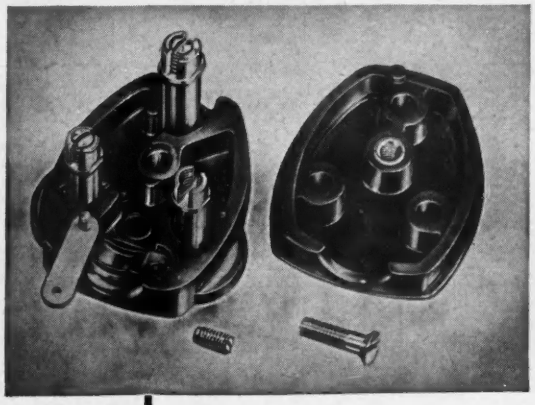

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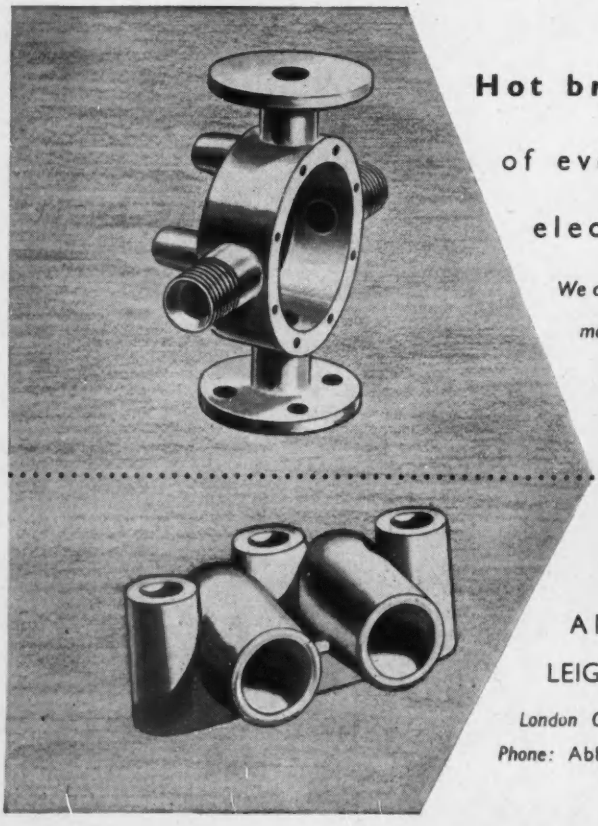

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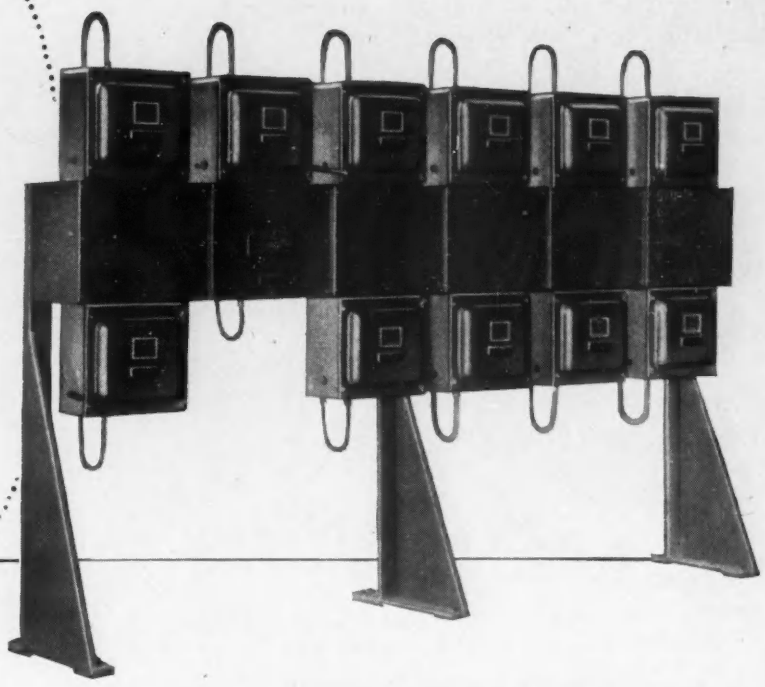

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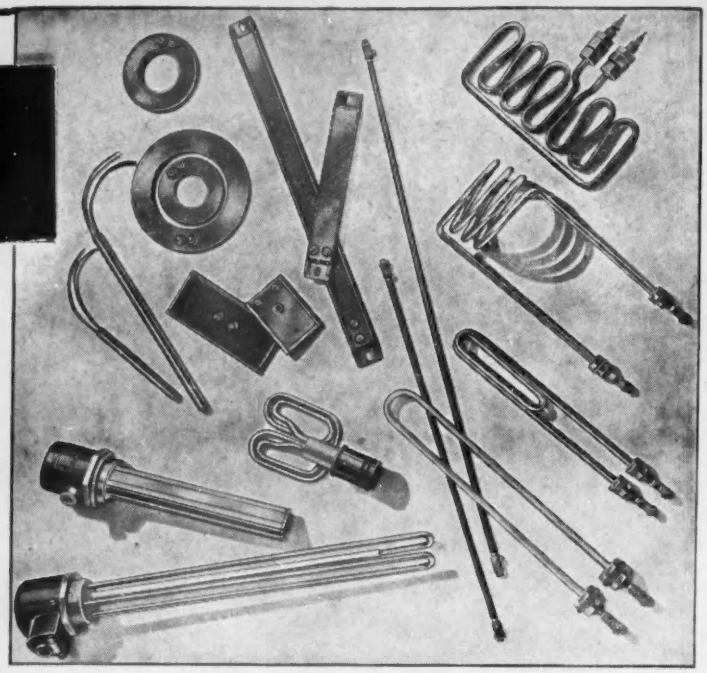

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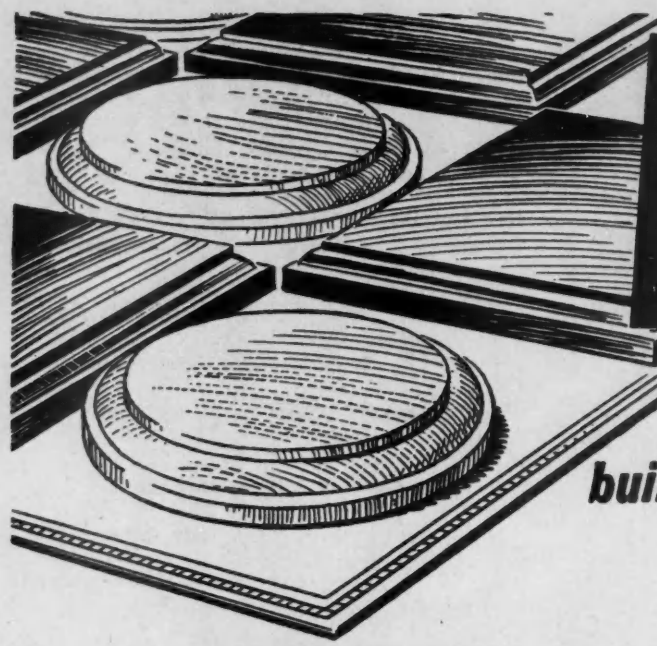

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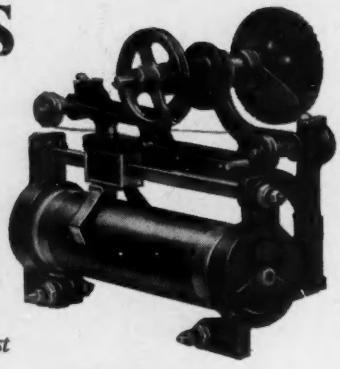

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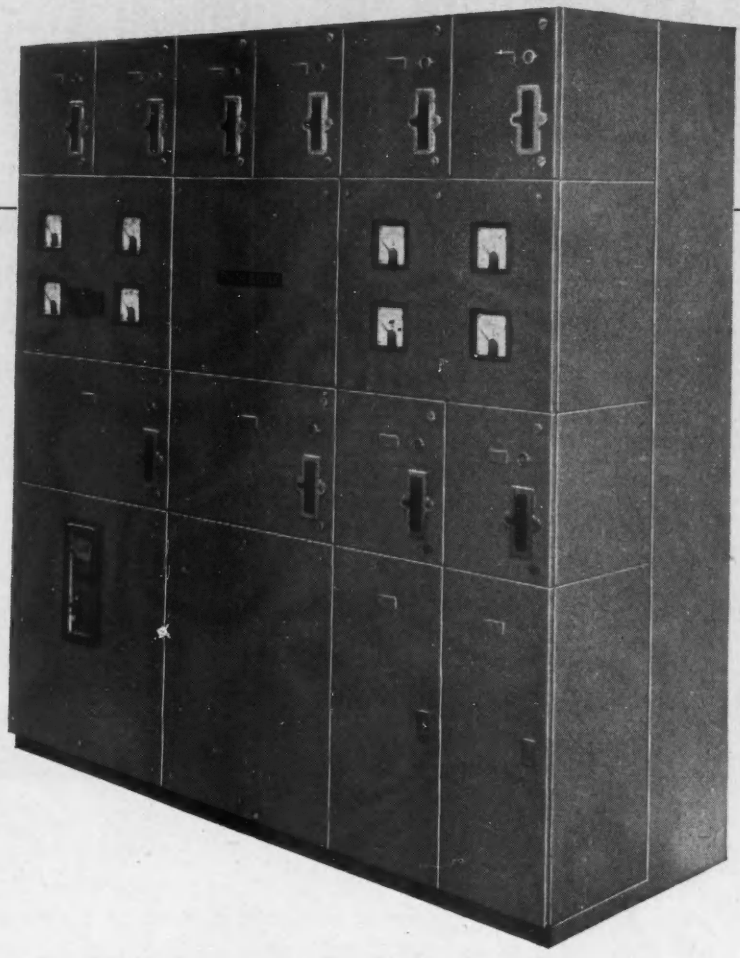

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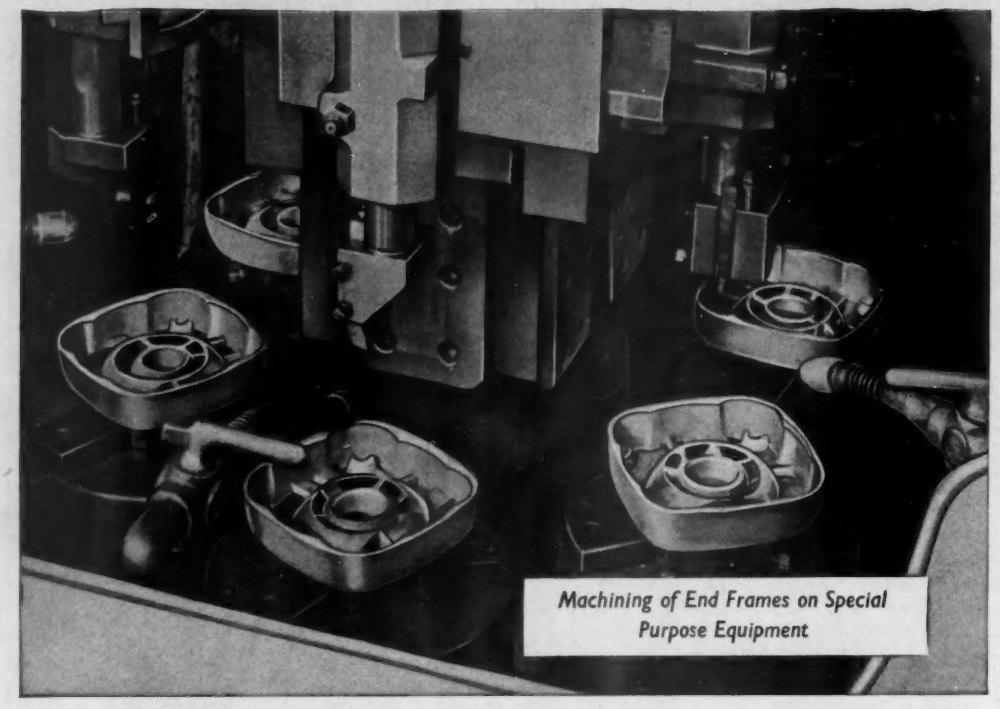

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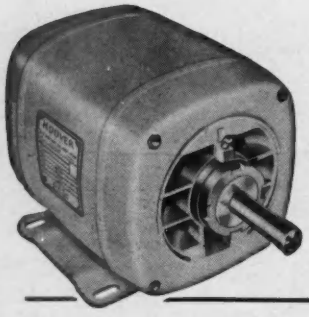

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ELECTRICAL TIMES

ESTABLISHED 1891

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PLANT CEILING CRAMPS EXPORTS

Disappointment with the ceiling placed on annual power plant commissioning by the Government has been voiced for several years now, but as the recently published B.E.A.M.A. report shows, it is still a live topic, although the background to it may have changed. The electrical and allied manufacturers state they have installed factory plant on the basis of 2,000 MW a year for the B.E.A. and another 1,000 MW for overseas customers; but the Government still maintains its 1,550 MW home limit, largely on economics grounds. There is some improvement in the three year tolerance of 600 MW above this limit, which was the reward of persistent negotiation with Government representatives, but what is needed is a firm and continued target at the 2,000 MW level. Without this, British industry in general will not be well placed to proceed with that extensive electrification of its processes which is an essential prelude to the substantial increases in efficiency and output that are demanded of it. But beyond this important and often stated fact, there lie considerations more special to the electrical manufacturing industry—the second largest exporter in the whole British list. Plentiful power will boost the purchase of domestic and commercial plant as well as industrial. The effect of such an improved home market on exports would be strongly beneficial; the case for that 2,000 MW per year is considerably strengthened by such indirect considerations of national interest.

OBSTACLES TO OVERSEAS SELLING

Strong continental competition is given in the B.E.A.M.A. report as the principal reason for the slight decline in the electrical industry's share of world trade last year. Two special difficulties experienced by British exporters in fighting off competition from this source are noted; hidden subsidies and price cuts, and long term credits. Continental electrical firms seem to be able to offer these more readily than their British competitors, usually as a result of official encouragement and help; but the important observation is offered that cuts and credit seldom occur together. In general, it is the consumer goods which are the subject of exercises in price cutting, while capital goods show high prices, but offset these by the offer of attractive credit terms. Possibly some improvement in this situation may arise from international discussions which are now under way; in the long run their continuance might be dangerous. There are some other features of this continental competition, however, which manufacturers can, if they think it wise, counter individually; delivery promises

backed by penalty clauses and a firm contract price are offered from the Continent and prove undeniably attractive to the customer. Finally, there is the question of a high standard of on-the-spot service, which has been discussed before in these columns. The fact remains, however, that in spite of the difficulties which it reviews, the report demonstrates the electrical industry is performing a fine job in the export field.

PORTABLE SAFETY

There was a minor battle of the systems at the I.E.E. Utilisation Section meeting held last Thursday. Not a.c. or d.c. this time, however, but which voltage for portable tools—110 or 50? The earnestness with which the engagement was pressed must have been most encouraging to those concerned with electrical safety, because it is not so long ago that the idea of any reduction below mains voltage for portable tools was dismissed as impracticable by many engineers. Cost considerations, voltage drop, and similar difficulties were all put forward when 110 V between lines, 55 V to earth, was first pressed by the Factory Inspectorate. Now no one questions 110 V, though not everyone uses it, and as our report on a later page shows, there can be little doubt that 50 V, centre tap earthed is a practical proposition as well. Both can offer almost complete safety from shock even in the most difficult conditions, the 110 V system requiring more complicated auxiliary apparatus to "make quite sure," but the 50 V arrangement presenting undeniably the more difficult distribution problem. What was especially noticeable about the excellent discussion which followed the paper on this subject, was the high proportion of electrical engineers from the chemical industry taking part. Wet conditions, corrosion, and the need to work largely on well-earthed metal makes their electrical safety problem particularly difficult. For industry as a whole, however, it seems that 110 V centre tap earthed supplies, combined with systematic maintenance of apparatus and leads, and with regular tests on earthing systems, would, if widely adopted, give a degree of safety from shock which would soon reduce the number of shock accidents in which portable tools are involved.

B.I.F. OUTLOOK

What success will the B.I.F. achieve this year? The question is in many minds as final preparations are made at Castle Bromwich and in London. Signs of a decline have been apparent for some time now, in spite of the help given indirectly by such complementary attractions to overseas visitors as the Festival of Britain in 1951 and the Coronation celebrations last year. Certainly, the fair has become markedly less important as an electrical occasion; although the electrical section can still muster a respectable number of stands to represent the industry, more notable names are again missing this year, and spaces once keenly claimed are surrendered to firms outside the industry. There are many reasons offered for the decline of the Fair, one of the most likely being the increase in specialist exhibitions. The electrical industry can claim a notable success in this field with the Electrical Engineers' Exhibition; but this cannot, as at present organised, replace the B.I.F. in international effect. If this year's B.I.F. experience does indeed prove as disappointing as many are inclined to fear, then this is a problem whose solution will demand a high priority of attention.

ADVANCE IN IMPULSE TESTING

The utilisation of hydro-electric power generated in remote sites, particularly in countries which are in the process of developing their industrial potential, has been largely responsible for the trend toward ever-higher transmission voltages abroad. Such voltages, which range from 220 to 400 kV, require the most stringent attention to insulation and to insulation co-ordination; factors of great importance when lines are subjected to lightning or switching surges. In consequence it has become necessary to test high-voltage equipment under conditions which can simulate as closely as possible the magnitude of the surges which arise in practice, and for this purpose impulse generators have been widely used. Latest of these machines is the 3·2 MV plant installed at the National Physical Laboratory. With a stored energy of some 77 kW-seconds, this is regarded of sufficient size to be able to test equipment required for high voltage transmission systems, either in existence or projected, anywhere in the world. Apart, however, from its duty in proving commercial plant—and it is noteworthy that there is already a demand for testing 275 kV equipment for the supergrid—it will also perform the function of a research tool, particularly as regards corona phenomena, and dielectric properties of materials. The possession of this impulse generator will, therefore, not only enable British manufacturers to enter the very high voltage field with added confidence, but will also provide data on which more economic designs can be based.

B.E.A. REPORT PREVIEW

The detailed statistics for electricity supply in March, which appear on page 633, complete the figures for the sixth B.E.A. financial year, and give a preview of the leading facts that will be discussed in the Authority's next report, and in those of the area boards. An overall increase of 3,973m kWh, or 6·9%, in sales of electricity during 1953-54 has a much more satisfactory ring than the 3·5% which was recorded at this time a year ago. Moreover, all the area boards report increased sales, and the level of the increase, mostly between 6% and 9%, augurs well for the financial success of the year. What has to be observed as well, is that the increase in sales might have been substantially greater had the weather not tended to be warm during the twelve-month: calculations suggest that in "standard" weather conditions the increase would have been as much as 7·9%. There was, of course, a corresponding increase in the installed capacity of generating plant during the year, which at 1,436 MW is 8·3% of the total at 31st March 1953; this was slightly less than the proportion during 1952 to 1953. There is hope of further expansion in the rate of increase this year, provided that industrial prosperity is maintained.

Meteor

Single Wire Transmission

EARTH RETURN SYSTEM IS USED IN NORTHERN QUEENSLAND

By A. D. DOWSETT, B.E.E., A.M.I.E.AUST.

IN June 1952, the Cairns Regional Electricity Board, which operates in Northern Queensland, Australia, placed in service trial installations of a single-phase, single wire earth return rural transmission scheme to supply initially 32 farms in dairying and maize growing areas of the Atherton Tableland. It is believed that these farms were the first in Australia to be given supply by such a method. The State Electricity Commission of Victoria installed a similar experimental scheme last August to supply farms at Sedgwick, near Bendigo, Victoria.

In 1948, the Board became interested in this system, following on a paper presented by Lloyd Mandeno, B.E., M.I.E.E., to the New Zealand Institution of Engineers. This paper described the single wire earth return transmission used extensively in the Bay of Islands Area, New Zealand. (Proc. New Zealand Inst. Eng., vol. 33, 1947, "Rural Power Supply.")

On the Atherton Tableland the Board has already established an extensive network of three-phase 22 kV transmission lines, connecting villages and towns through the area. The problem had arisen to devise some method to extend supply economically to some 200 farms scattered over a wide area with a density of less than two farms per mile. Approximate estimates made at that time indicated that a saving of 35 to 40% could be achieved in capital cost on three-phase schemes.

By arrangement with The State Electricity Commission of Queensland, Mr L. Mandeno was invited to come to Cairns, in November 1950, to discuss, with representatives of the Commission and Regional Boards in Queensland the "single wire earth return" system.

New Zealand Practice

The single wire system, as operated in New Zealand, is shown schematically in Fig. 2. The latest practice in regard to the system is to employ 11 kV for the single wire voltage to earth. A single pole reclosing o.c.b. on one conductor between the fuse and primary of the insulating transformer is now used. This o.c.b. provides for two high-speed tripping operations and a third delayed tripping operation to allow section fuses to blow if there is any permanent fault. In the case of an intermittent fault which involves performance of the first and/or second operation, the o.c.b. is automatically reset and a cyclometer dial records the total number of operations, whether automatic or manual. Other features generally employed in New Zealand are:

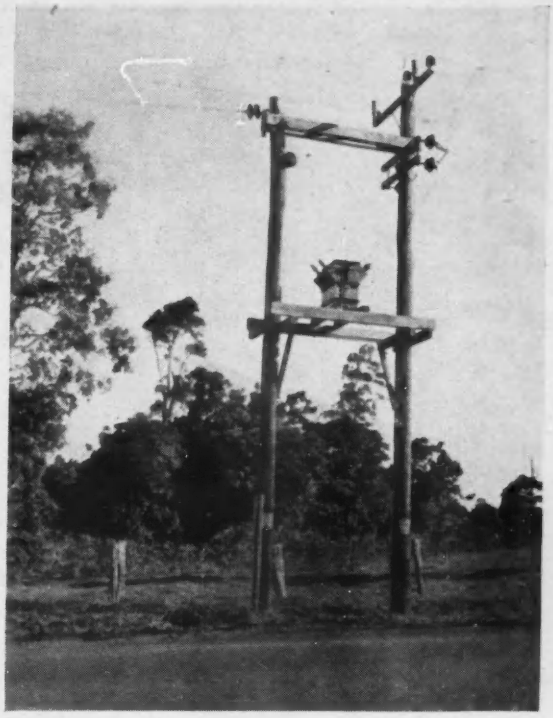


Fig. 1. Above is seen a 50 kVA, 22/12·7 kV single-phase isolation transformer substation. This was installed for the Malanda earth return trial

(i) A series parallel bank of capacitors is connected in the earth lead from the secondary of the insulating transformer. This feature not only provides power factor improvement, but reduces the kVA demand and provides a simple means of improving voltage regulation.

(ii) A maximum demand indicator of the thermal type is connected in series with the capacitor bank and earth connection.

(iii) A double spark gap is provided, connected directly between the single wire line and earth at each small distribution substation for lightning protection purposes.

Several advantages are claimed for the system. Briefly they are: (1) Simplification of line construction and substations with consequent saving in capital costs, manpower and materials. (2) Greater reliability in operation and lower annual costs. From experience in New Zealand, where already 3,000 consumers depend for their supply on the single wire system, it is claimed that a better service is provided because of improved protection given by the spark gaps with automatic reclosing breakers, and the simplicity of overhead construction which eliminates many causes of outages.

(3) As compared with the multiple earth neutral system of h.t. distribution (in which the use of earth leakage protection is impracticable) the single wire system for spur lines permits the use of earth leakage protection on the main three-phase h.t. distribution system. This feature is valuable in the prevention of the risk of electrical shock and as a safeguard against grass fires caused by fallen lines. On the single wire lines, the immediate isolation of a faulty circuit is ensured by the comparatively low setting of the protective fuses and automatic switches. Further, the earth fault currents on single wire spur lines are localised in the earth return area and do not return to the earthing point of the main h.t. system.

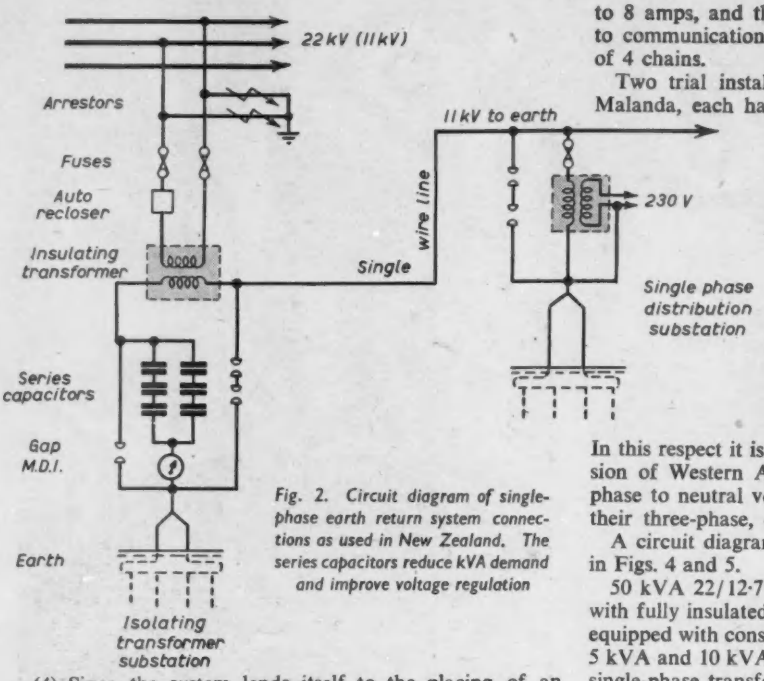


Fig. 2. Circuit diagram of single-phase earth return system connections as used in New Zealand. The series capacitors reduce kVA demand and improve voltage regulation

(4) Since the system lends itself to the placing of an individual transformer at each homestead (that is where separation exceeds 25/30 chains) better voltage regulation at consumers' premises is obtained.

Arising from this visit the Board, with the approval of the State Electricity Commission of Queensland, arranged with the P.M.G. Department to construct trial installations in order to gain first-hand experience and so that the P.M.G. Department could conduct tests to determine regulations for the protection of their services.

Telephone Considerations

An earth return system has greater inductive and coupling effect on communication circuits than the usual single- or three-phase systems. For the purpose of the trial

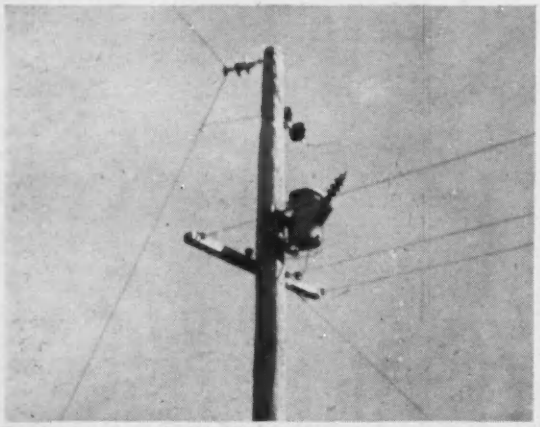


Fig. 3. This view of a 10 kVA distribution substation, part of the Atherton trial installation, emphasises the simplicity of construction of both the line and the substation equipment

installations, the P.M.G. Department permitted conditions similar to those operating in New Zealand for the protection of telephone circuits. The major limitations under these conditions are that the earth return current is limited to 8 amps, and that the single wire line running parallel to communication lines shall have a minimum separation of 4 chains.

Two trial installations were selected at Atherton and Malanda, each having its own isolating transformers and supplying initially 20 and 12 farms respectively. Each initial installation can be expanded to cover 30 to 40 farms from the existing isolating transformer.

A single wire voltage of 12·7 kV was chosen, as this voltage provided a reasonable capacity for the system (for 5% drop, the capacity of a 3/12 galvanised steel conductor is approximately 200 kW-miles or, using 7/·064 B.C.C.—1,400 kW-miles), and it is the phase to neutral voltage of the Board's 22 kV transmission network. In this respect it is noted that the State Electricity Commission of Western Australia have adopted 12,700 V single-phase to neutral voltage for rural transformers for use on their three-phase, 4 wire, 22 kV transmission system.

A circuit diagram of the Atherton installation is shown in Figs. 4 and 5.

50 kVA 22/12·7 kV, single-phase isolating transformers, with fully insulated windings, were installed and they were equipped with conservator, breathers, and internal tap links. 5 kVA and 10 kVA, 12·7 kV single h.t. bushing, 480/240 V single-phase transformers were used for distribution. These transformers have graded insulation on the h.t. winding. To reduce cost to a minimum, oil conservators and tap-

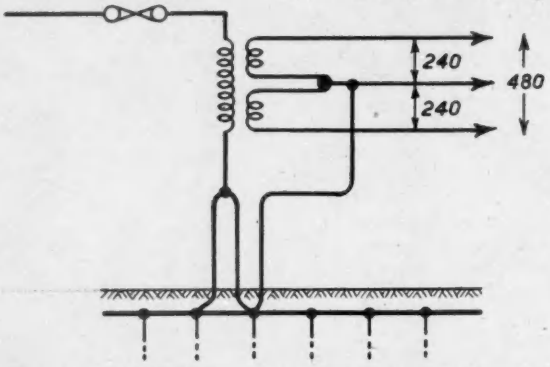


Fig. 4. Connections for a single bushing distribution substation on the Atherton installation, which is shown in Fig. 5

pings have been omitted. On one make of transformer used, double break arcing horns across the h.t. bushing have been installed.

Distribution Substations

The distribution substations are very simple. Substation earths are of major importance. The h.t. earth connection from transformer to earth electrodes has been duplicated on all substations. The minimum earth resistance value required in New Zealand and which was stipulated for the trial installation was 5 ohms, although, in the case of the isolating transformer, the practice in New Zealand is to reduce the earth resistance to a minimum of 2·5 ohms.

The Board carried out soil resistivity tests at all substation sites in the area. The result of the test, in general, indicated average values of about 15,000 ohm/cubic centimetre, but there was considerable variation ranging from 1,820 to 37,500 ohms/cubic centimetre. This variation was surprising as the red volcanic soil, which is of considerable depth, extends more or less uniformly through the Table-

land area. The lower values were found in hollows between undulations, and where the ground was generally flat the values did not vary to any great extent.

After conducting tests on the earth values of various lengths of individual rods it was decided to standardise on driven rods of ¾ in. round steel 18/20 ft in length and spaced 36 ft apart. As treatment of the soil with salt proved very effective coarse salt was placed in a circular trench around each rod. All rods are connected by a 7/104 b.c. conductor buried in an 18 in. trench. The connection to each rod was sealed in a small tin of bitumen. The soil resistivity tests were used as a guide to the number of rods required at each site.

Transmission Line Design

In the main, a 3/12 galvanised steel strand of 90 ton quality was used as the single wire transmission line conductor and every advantage was taken for long span construction in undulating country. The average span on the 3/12 galvanised steel sections of the route of the trial installations was 1,020 ft and the longest individual span 1,940 ft. At each pin insulator support an armour rod damper was installed on the 3/12 steel conductor. The single wire line afforded very simple pole structures and a considerable saving in stays.

Because of the requirement to provide a minimum parallel separation of 4 chains from the telephone line, the route of the single wire line had to be located on private property. In the two trial schemes the routes selected provided sections where parallels to P.M.G. lines were obtained for over one mile at a separation distance averaging approx. 6 chains in order to facilitate tests.

Tests were conducted by officers of the P.M.G. Department in June 1952, to determine interference values on the telephone network. The tests were extensive and, together with similar tests since carried out in Victoria, will provide valuable data which should assist in formulating the conditions that will govern the erection of single wire earth return rural transmission lines throughout the Commonwealth. The tests covered measurements of induction, telephone influence factor, noise levels, earth potential gradients, and harmonic analysis. As a result of these tests no undue interference is expected. No complaints have been received during the period since the installations have been placed into service, and operational experience has been satisfactory so far.

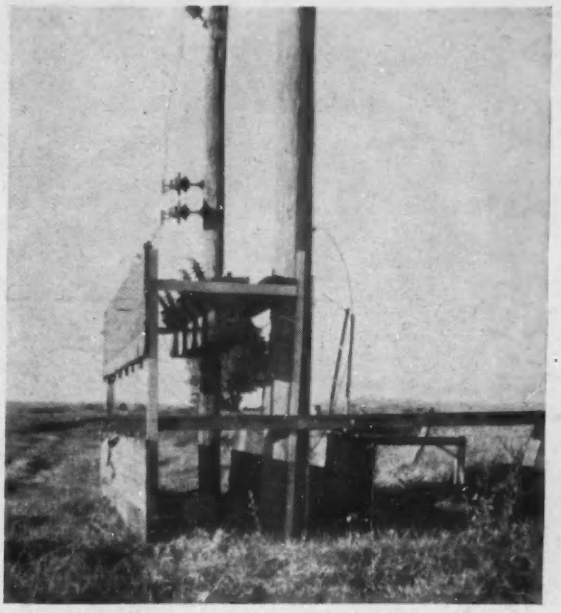


Fig. 6. This temporary substation, used during the Malanda trials comprised a band of five 10 kVA single bushing transformers and incorporated an improvised water resistance

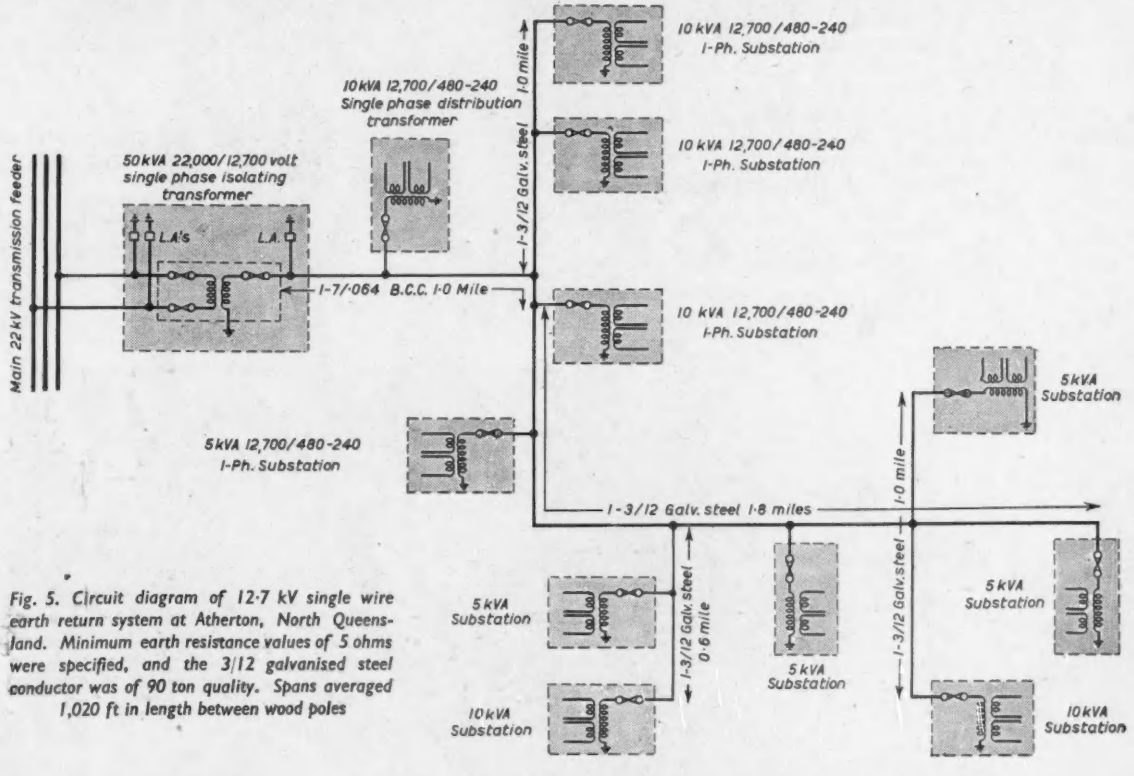


Fig. 5. Circuit diagram of 12·7 kV single wire earth return system at Atherton, North Queensland. Minimum earth resistance values of 5 ohms were specified, and the 3/12 galvanised steel conductor was of 90 ton quality. Spans averaged 1,020 ft in length between wood poles

Fig. 7. The background to this view of a 10 kVA distribution substation of the Malanda trial installation shows undulating dairying country typical of that in which the trial was carried out

Future Plans

The Board plans to consider further application of this system to suitable areas. Such plans will, of course, be governed by the P.M.G. Department regulations, when issued, covering this scheme. Consideration would then be given to the provision of the features referred to earlier which improve the operation of the system.

It is considered that the single wire system has its special application and merits in extending within rural areas to farm homesteads which are widely separated to enable a supply of electricity to be given to meet normal farm requirements at reasonable cost. Its application is not suggested where transmission lines would be required ultimately for a major development of a transmission system in a region.

At the time this article was prepared it was not possible to give a proved assessment of cost savings, but these are considered to be of the order of 35% to 40% on the capital cost of standard three-phase construction. The State Electricity Commission of Queensland has approved the single wire system for use in rural areas, subject to the considerations discussed above.

The ELECTRICAL TIMES acknowledges with thanks the assistance given by Mr H. Neil Smith, Commissioner for Electricity Supply, State Electricity Commission of Queensland, in preparing this article, and in granting permission for its publication.

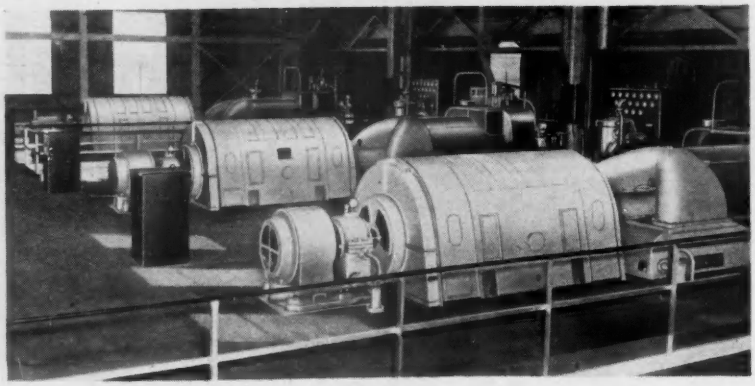
A Queensland Steam Station

TOWNSVILLE PLANT NOW IN FULL OPERATION

THE Central power station at Townsville, which was opened in July last year, is making an important contribution to the further development of North Queensland. It contains three 7,500 kW, 3,000 r.p.m. 11·5 kV Metropolitan-Vickers turbo-generator sets, the turbines operating with initial steam conditions of 400 lb/sq in. 750° and exhausting at 28 in. Hg to Metropolitan-Vickers condensers of 9,500 sq ft cooling surface. Two-stage feed heating raises the temperature of the feed water to 200° F at the maximum continuous rating, and an evaporator is provided for each unit. The station also contains a house set, consisting of a 750 kW, 7,500 r.p.m. back pressure turbine exhausting at atmospheric pressure and geared to a 1,500 r.p.m. 440 V a.c. generator.

Commissioning of this new power station has made it possible to close down two smaller and less efficient plants. Power will be distributed at 66 kV to Ingham, Home Hill and Ayr, and the station will also provide a supply for irrigation work on the Burdekin River, and subsequently to the Burdekin Dam site for construction purposes.

Further extensions consisting of three 15 MW sets are reported in the Sixteenth Report of the State Electricity Commission of Queensland. These are part of a development programme which includes Howard, Rockhampton and Townsville.



View of the turbine room in the Central Power Station at Townsville, Queensland, showing the three 7,500 kW Metropolitan-Vickers sets

Electricity at Home and Abroad

B.E.A.M.A Annual Report Discusses Export Problems

ONCE more this year the accent of the British Electrical and Allied Manufacturers' Association report is on exports; but so closely are home trade considerations entangled with this theme that the report has much to say about these as well. Published last week, the report covers the year 1953-54.

One of the main topics is heavy electrical plant. Members of the Association have planned and equipped their works to provide the B.E.A. with an increasing amount of plant up to 2,000 MW per year, "generally acknowledged as the minimum amount required." In addition, provision has been made for the supply of 1,000 MW per year to overseas markets. Government directives to give priority to potential export orders at the expense of home purchases have been resisted successfully, and after many discussions a tolerance of 600 MW has been agreed for power station construction above the 1,550 MW limitation imposed under the Government's capital investment policy. B.E.A.M.A. intends to continue to press for 2,000 MW a year as being essential for the re-equipment of British industry.

During 1953, for the first time since the war, there was no overall rise in electrical exports. Experience varied over the industry, bright spots being transformers, switchgear, turbines, radio, lamps and locomotives; dull were most items in the domestic division plus motors, cables, valves and batteries.

The chief factor contributing to the slight fall in the electrical industry's share of world trade is growth of foreign competition. Continental competitors especially are resorting to every device to regain old strongholds and establish new markets. Their price campaign is conducted by incentives, by price cutting and by extended credits; they also offer shorter deliveries and more attractive terms of payment. Some of the low prices experienced cannot be accounted for purely by the operation of incentive schemes, and it appears that they are obviously part of a planned campaign and that they are subsidised in some manner. It is noticeable, however, that extended credits are not, as a rule, applied to low cut prices.

Another factor to which attention has been given is the continental practice of quoting firm prices. It is felt that where delivery periods extend beyond 18 months, the risks of labour and material variations are too great to justify any departure from the B.E.A.M.A. contract price adjustment clauses.

Purchase Tax and Legislation

At home, purchase tax continued to impose its heavy burden on many electrical products. B.E.A.M.A. has supported a scheme to provide official means for rebating tax to retailer-stockists when reductions are made in p.t. rates. This applies particularly to the larger electrical appliances, which are readily identifiable. The scheme, produced by the British Radio Equipment Manufacturers' Association, was submitted to the Chancellor of the Exchequer in November last. A reply is still awaited.

Three Parliamentary Bills of particular interest to the Association were considered during the year. The Inventions and Designs (Crown Use) Bill, which affected permanent use by the Crown of Wartime powers over certain inventions, has been much criticised, and the F.B.I. has recommended that it should be withdrawn, and a Court of Enquiry established to examine the whole position. The Mines and Quarries Bill, which places certain responsibilities on suppliers of mining equipment, has some practical defects, and strong representations have been made which it is hoped will result in amendments designed to protect the manufacturer's position. Finally, the Industrial Organisation and Development Bill, designed to extend the original act, was strongly opposed by many industries, including the electrical.

During the year the Association has been concerned in a Monopolies Commission enquiry. Once more the report stresses the strain which this places on the industry. In connection with the general question of the enquiries which the Commission is conducting, representations were made demanding that an industry should be informed of the criticisms and charges being made against it. The dangers of disclosing statistics to overseas competitors was stressed. As a result of these representations, discussions have taken place with representatives of the Board of Trade. The whole matter is at present still under review.

During the year, the Association of Short-Circuit Testing Authorities was extremely active. Discussions were held with the appropriate American I.E.E. committee about many items of difference, and "a degree of accord was reached." Matters affecting the range of equipment for which it is permissible under the Association's rules to grant a certificate have been discussed, and some new publications giving rules for unit testing, for air-break c.b.s and for air-blast c.b.s should be available shortly. A Code of Practice for the short-circuit testing of switchgear is being drafted by a B.S.I. Committee.

Annual General Meeting

At the B.E.A.M.A. annual general meeting held last Thursday, Mr D. D. Walker, chairman of the Council, paid tribute to the efforts made by the B.E.A. to keep pace with the increasing demands for electricity. There had been some danger that unfettered demand for electricity, like the making of profits, would go out of fashion.

Speaking of the future before the industry, Mr Walker pointed out that the coal supplies of the world were slowly running out, and nuclear energy would probably replace coal in a number of our power stations in the not far distant future. "At the moment that is as far as we can see, but what of the possibilities of the direct transference of nuclear energy into electricity? No doubt much theoretical work is being done in this direction, but with the present aura of secrecy surrounding the subject, we laymen cannot tell how far fantasy has progressed along the road to fact. And this leads me to hope that, subject to the essential demands of security, facilities will be made available for the dissemination of knowledge on as wide a basis as possible. Certain sections of our industry and certain individual firms have done great work in solving specific problems put to them and providing the appropriate equipment. But how much greater progress can be made when the problems are common knowledge and the inventive genius of our whole industry are given free play. It is encouraging to hear that training facilities are to be provided in the near future on a selective basis, but if we are to hold our own in the engineering world of the future we must sow the seed widely so that it will grow abundantly."

Electrical Times, 29 April, 1954

Largest H.E. Project in New Zealand

AFTER considerable delay progress on the South Island (New Zealand) Roxburgh hydro-electric scheme is now reaching an advanced stage and an effort is being made to get the first of the turbines running by the latter part of 1956. The original schedule called for the operation of two generators by May 1956, but is regarded by the contractors responsible for the work as too ambitious.

One of the major difficulties has been the high turnover in the labour force at the site, some 100 miles from the city of Dunedin. The extremes of climate have sent men who arrived at the scene in search of big pay packets back to seek less rigorous conditions. In January, for example, the day temperature is about 90° F, while in winter, when deep snow is on the hills, frosts take the temperature down to some 20° F below freezing.

Another difficulty has been the changeover from direct Ministry of Works control to the contractors—Cubitts, Zschokke—although this is now satisfactorily overcome,

The scheme involves the damming of the Clutha River, to provide ultimate hydro power for eight 40 MW generators. Four of these are on order from B.T.H. and are to be driven by 136·5 r.p.m. 60,000 h.p. Francis water turbines to be manufactured by the Dominion Engineering Co. of Canada. When completed the civil works will involve the construction of a 1,200 ft long dam across the valley.

The generators themselves are rated at 44·44 MVA, 10/11·5 kV, 0·9 p.f., and each has a flywheel effect of 22·2 million lb ft; the machine has an overall diameter of 830 tons. Several novel constructional features have been incorporated. For example it is possible to remove the complete rotor without disturbing the shaft or thrust bearing, or to remove a rotor pole without having to remove the rotor from the stator. To give adequate cooling, despite the low speed and long core length, cold air is fed in at the centre of the rotor as well as at the ends. Stator core laminations are of special 3·5% silicon steel.

It was specified that the generator manufacture should couple the generator and turbine shafts together and revolve them in a lathe for truth, and the facilities at Rugby proved equal to this task despite the size and lengths of the shafts.

The generator transformers (an order was placed in 1950 for some 13 of these with Messrs Ferranti Ltd.) will step up from the generator voltage of 11 kV to 220 kV. The units are single-phase, 14,800 kVA, and will form four 3-phase banks for the first half of the scheme.

At the moment, work is progressing on the diversion works, which include the power station, and it is hoped to divert the river through the new channels by the end of July, when work will be able to start on the construction of the main dam.

This aerial view shows the progress being made. The main structure consists of the preliminary section of the dam, the spillway and the power house located in the diversion cut. The dam will ultimately extend right across the valley. At the top of the page is shown a closer view of the three spillways and sluice gates

around the trade

by Peregrin

THE unexpected decision to abolish "uplift" has caused a flutter in electrical trade circles, and not everyone is pleased. Wholesalers especially, or some of them, wonder to what extent this small concession will strengthen the manufacturer-retailer partnership, already well established. The long and oft debated question arises once more—is the wholesaler a necessary link in the structure of electrical trading. That question was being asked, with wise shaking of heads, long before purchase tax added to the problems of our trade, and it will still be asked after the tax has become but an unpleasant memory. The answer surely may be seen in the immense size and prosperity of the wholesale trade, and the high esteem with which it is regarded by retailers and manufacturers.

Few Advantages

Apart from special trading arrangements such as closed agencies, it is not easy to see any advantage in excluding the wholesaler. To take two examples—supposing a contractor-retailer wishes to offer his customers a liberal choice of say twelve makes of lamp, and supposing he likes an equally lavish selection of cable for his wiring jobs, he may easily find himself with twenty-four separate ledger accounts on his hands, with all that is involved in office work and duplication of stock. By dealing with a wholesaler he still has a free choice, keeps his stock low and only has one ledger account to handle, unless of course he deals with more than one wholesaler. The manufacturer is no worse off, in fact he may benefit, for instead of a multitude of small accounts with contractors he will have a comparatively small number with wholesalers, all ready and willing to support him with their efficient organisation.

Mutual Content

I questioned a retailer friend on this and he naively admitted that he likes buying through wholesalers because he can "mess them about." Pressed to explain, it emerged that, having a large and regular account with a wholesaler, he feels at liberty to put him to some trouble. To make him obtain any small, elusive and usually unprofitable item for a special purpose, to return things found not suitable, exchange things for another make or type and even borrow articles for inspection and trial. He would not feel quite so free to impose on an individual manufacturer in that way, especially in view of the much smaller account. I mentioned this aspect of trading to a well-known wholesaler, and he was not at all perturbed. Surprisingly, he said he rather liked being messed about in that way. It implied confidence in him. He regarded it as all part of the service he offered, and it formed a strong bond between him and his customers.

So it is fairly certain that the wholesale system is too well established and too much esteemed to be prejudiced by this "uplift" concession, and the manufacturers will no doubt heartily agree. Let us therefore be thankful for small mercies, for the old method was far from uplifting to the tempers of those concerned with it. It was an irritating device and we are well rid of it.

The Fair Trading Policy comes of age this year, and the old British custom of celebrating every possible event and anniversary will no doubt provoke some kind of recognition during the summer. A cynic may well inquire what there is to celebrate, or even marvel that such a puny and neglected child managed to survive to manhood. Many of us, manufacturers, wholesalers and retailers alike, will contemplate our godchild more in sorrow than in anger and ponder wistfully on what might have been, while some, one cannot help thinking, have not yet heard of the F.T.P. or have conveniently forgotten it.

So it is comforting to be assured that the Policy is still very much alive with our friends in the supply industry. At the recent E.D.A. Conference Mr R. E. Gamlen's excellent paper compared the selling cost of electrical appliances with retailing costs in other trades. The Author contended that the boards' profits would be much higher but for the restricted discounts accepted, which seems to imply that the boards could demand and obtain special discounts, as do large buyers in other trades, but for the watchful eye of the Fair Trading Policy. Mr Gamlen also blames the Policy for the difficulty of disposing of stocks. This is not easy to understand. Stock that has become shopsoiled, obsolete or in any other way depreciated, may be sold for what it will fetch, even at a loss. If, however, Mr. Gamlen means stock rendered surplus through overbuying or underselling, that is another story, and one that all electrical retailers have to tell sooner or later. In such a situation surely it is wise to hang on and hope for the best, rather than give the stuff away. One can imagine the disastrous effect on the electrical trade generally if all the boards suddenly unloaded their stock on to an eager public, and it is a relief to feel that the boards' commendable loyalty to the Fair Trading Policy is a sure safeguard.

In the same paper Mr. Gamlen quoted some seemingly startling sales statistics for 1950. They show for instance that although there are almost nine times as many retailers as board showrooms, employing more than eight times as many persons, the retailers account for not much more than five times the sales of the boards. This seems understandable when the figures go on to show that "Sales per Establishment" and "Sales per Person," of the retailers, were not much more than half those of the Boards.

Startling Statistics

I hasten to anticipate the roar of protest from electrical retailers by admitting that the figures do not present a true picture. For instance, cooker sales, which are becoming a rarity with the private retailer, form a huge proportion of the sales of the boards, and, with the generous hire-purchase charges available, probably do not demand a high degree of sales effort. Further, a tremendous volume of sales of expensive appliances such as cleaners and refrigerators, are merely "put through" the boards' showrooms by the manufacturers' salesmen. The boards have no salesmanship to provide, in fact they scarcely handle the goods at all, but draw a handsome profit from them.

Safety for Portable Tools

Special Supplies and Circuits have a place in Industrial Applications

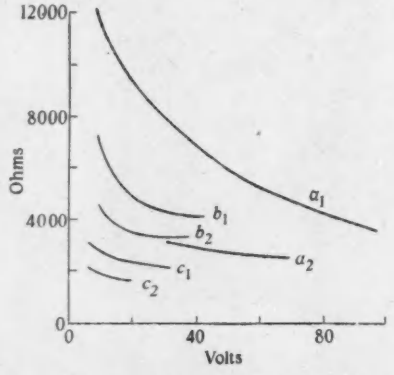
PORTABLE tools and such transportable electric equipment as electric welding sets may be used by unskilled people in any part of a factory. The risk that this entails is underlined by accident statistics in 1951, when two-thirds of the electrical fatalities in factories involved voltages below 250. 80% of deaths in this category were associated with portable equipment. Thus there is ample justification for devoting an I.E.E. paper to the subject of "Safety in the use of portable and transportable electrical equipment in industry," which was the title of that presented by Mr J. W. Bunting, B.SC.(ENG.), A.M.I.E.E. (Courtaulds Ltd.), to the Utilisation Section last Thursday.

Shock Considerations

Since it is well to define a problem before attempting its solution, Mr Bunting introduces a discussion of electric shock into his paper. He suggests that two kinds of shock can be fatal at low or medium voltages, the first being due to muscular contraction of the chest muscles, causing death by asphyxia within two or three minutes, and the second, shocks associated with derangement of the heart action, known as ventricular fibrillation. This condition, once established, is continued regardless of any first-aid treatment, and death is virtually inevitable.

To avoid the second type of shock, about 100 mA is the maximum safe current through the chest wall for one second or more; but if the duration of current flow can be limited to about 0·03 second, experiments imply that there is little risk to the heart even from a current of 1½ amps, although this would, of course, cause severe burns and violent muscular reactions.

Minimum body resistance from hand to hand or hands to feet may be taken as 1,000 ohms. At 240 V, then, there would be grave danger of fibrillation if the voltage were maintained for more than a fraction of a second. At 110 V,

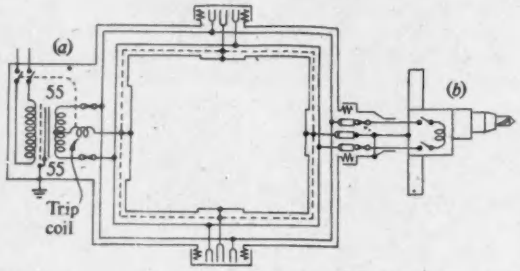


Body resistance of different subjects. (1) "dry, thin man", (2) "fat, full-blooded man". (a) d.c. between dry hands, (b) a.c. between dry hands, (c) a.c. between wet hands

there is still danger in industrial situations, although this voltage may be a sound and effective compromise for domestic appliances. 50 V becomes comparatively safe, partly because body resistance tends to increase with decreasing applied voltage, and it is difficult to envisage circumstances in which a shock at 25 V would prove dangerous to a man in normal health.

With the voltage question discussed, there remains the influence of type of supply—earthed or insulated neutral? Although the latter seems in some ways ideal for industrial portable equipment, many difficulties arise in practice, and for 415 V, three-phase supplies, earthed neutrals seem preferable. Where this voltage is used, it is recommended that the neutral of the supply should be well earthed, and bonded to a copper strip laid round the factory to form a ring, and perhaps earthed at other points. All exposed metal work should be connected to this, if necessary via an earth continuity conductor run with any spur of conduit.

For full protection of portable and transportable equipment, however, this is not considered sufficient, and two main principles need to be applied. Extra-low voltage may



Butcher system applied for the protection of a 110 V circuit; (a) earth leakage circuit-breaker; (b) ordinary 110 V tool

be used without further precautions; or low or medium voltage may be used if some system exists to prevent a lethal voltage arising on exposed metalwork.

Extra-low Voltage

As already mentioned, 25 V is practically completely safe, but voltage drop considerations rule it out in many cases—the author instances a 3 kW fire with a 120 amp element connected through welding leads to a 150 amp plug and socket. On the other hand, for portable hand lamps and for any bench or machine-tool lighting it has much to recommend it. This is the more so because hand lamps are found by experience to be so vulnerable, and because they may be used in any part of a factory. There is the advantage, too, that not only is the filament more robust, but the light output is about 60% greater than that of a 240 V lamp of the same power.

For a 60 W lamp, a twin 40/·0076 in. flexible cord may be used, giving a voltage drop of 1·7 V for a 25 yd lead. Portable transformers may be used for the supply.

50 V, with mid-point earthed, is sufficiently safe to be used without running an earth core to the tool frame, but in spite of its superficial attractions, it is not recommended by the author. Together with the safety advantage, it offers robust and reliable tools at only 10% higher prices than for 110 or 240 V equivalents. A 50 V tool is on average only ¼ lb heavier and 5% less efficient than one wound for 240 V. The chief disadvantage still lies in voltage drop, for only 2·5 V drop is permissible if the portable-tool manufacturers' recommendation of 95% nominal voltage is to be met.

Supply has to be through either 500 or 1,000 VA fixed transformers feeding one or two fixed sockets, or through

portable transformers. The first method is expensive and lacks flexibility; moreover, regulation considerations prevent advantage being taken of the overload capacity of individual transformers. With portable transformers a 24 to 30 lb load has to be carried around for a 500 VA supply, while a more subtle danger arises from the need for extension leads to 240 V sockets. These may be necessary, since the use of 50 V extension leads will again introduce voltage drop problems. There is the additional risk that if an earth wire becomes loose, the 50 V winding centre point may be raised to 240 V.

110 V System

At present, the Factory Inspectorate recommend the use of 110 V, mid point earthed for portable tools, while stating that some cases of special risk, such as arise inside boilers and tanks, make a lower voltage desirable. The author feels that the occasional need for special precautions means that they should be used everywhere, so that any tool can be used anywhere with all reasonable safety.

At 110 V, mid point earthed, voltage drop is not especially troublesome, and a ring main can supply socket outlets over a considerable area from one or two transformers. These feed through double-pole fuses, and a double-pole fused plug is used with each portable tool. Because of the distribution of earth fault path impedances it is unlikely that a voltage even as high as half the nominal 55 V will appear on the appliance frame in the event of an earth fault. If the earth wire is broken or becomes detached, then some danger does exist, but this is very slight in normal industrial conditions, though much more pronounced inside a boiler.

To overcome this risk, the Butcher system may be used. This has the mid point of the transformer secondary connected to earth through the trip coil of an earth-leakage circuit-breaker. This has the effect, amongst other advantages, of tripping off the supply if the earth core is discontinuous, and the tool touches earthed metal.

Mains Voltage

If a 240 V a.c. supply is used for portable appliances, it is considered that it must be controlled by a circuit-breaker designed to cut off the supply within about 30 milliseconds in the event of a fault occurring to the casing; this is necessary to avoid any risk of ventricular fibrillation.

It is considered that the earth lead should be continuously monitored and that for preference there should be a direct connection from casing to earth, in addition to any connection made via a relatively high impedance trip coil. One method is to feed the tool through a four core cable, two of the cores carrying a circulating current that completes its path auxiliary earth-main earth-casing-trip coil-auxiliary earth. A free handle mechanism is provided to prevent the circuit-breaker being held in if the earth connections are not sound. In the case of an earth fault, the breaker trips in from 4 to 12 milliseconds.

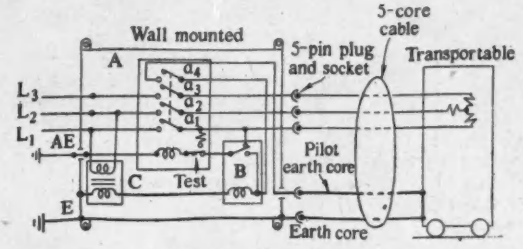
Transportable Equipment

In general, power demands make it necessary for transportable equipment to be supplied at mains voltage. A three-phase form of the earth monitoring circuit-breaker described above may be used. For the last two years about 40 breakers of this type have been under observation in textile mills and chemical works, with only two faults, each involving burnt out coils caused by stray welding currents. Subsequent modifications have been made to protect windings in such circumstances.

An alternative is core-balance protection, but it is considered that the necessary sensitivity, besides being difficult to achieve, would be a nuisance. If it could be combined with an efficient form of earth-monitoring device, however, it might have some attractive features, and there is scope for research in this direction.

Maintenance

Finally, some attention must be paid to the choice and maintenance of equipment. Live metal must be adequately protected—light plastic covers are insufficient. Cord grips



Monitored-earth three-phase circuit-breaker unit. This can use a poor local earth impedance up to 500 ohms.

capable of resisting at least a 14 lb direct pull should be fitted, and the cable should be stiffened at the entry point. Control switches should operate on all poles.

Above all, portable tools should be the subject of an effective and systematic maintenance system. In addition to insulation and continuity tests there should be a visual inspection of plug connections and of the cable sheaths. Earth loop impedance tests should be carried out regularly at all socket-outlets, and a record kept of the results.

DISCUSSION

MR H. W. SWANN (Chilton Electric Products), in discussing ventricular fibrillation recalled that a Continental expert had suggested that fibrillation might be reversible after a long period, perhaps 10 hours. This might be a factor in favour of the rocking stretcher method of resuscitation. He thought that the author's value of 1,000 ohms for the human body was excessively low; the late Sir Bernard Spilsbury often suggested ten times that value for a hand-to-hand connection.

It was necessary to realise when insulated neutral supplies were considered, that there were usually enough connections from phase to earth, by means of capacitance, and indicator lamps, to nullify the apparent safety that the system operated. It was of interest to note that 110 V d.c., as used in some shipyards for portable tools and inspection lamps, seemed very safe from the shock aspect, judging by experience.

So far as handlamps were concerned, he felt that the all-insulated Home Office pattern was safe for most industrial applications.

MR S. J. EMERSON (H.M. Electrical Inspector of Factories) said that in spite of the evidence produced by the author, experience suggested to him that a hand-to-hand shock was less dangerous than one from the hand, down through the legs. Where portable transformers were used, they should never have a metal case, for fear that a fault from the primary to the case may impare the higher voltage on the secondary conductors.

With the safety system described by the author, there was a fear that a half-cycle shock might be given before the protecting circuit-breaker opened; this might knock the user off, e.g., a cat walk. A somewhat similar Nalder device incorporated a non-linear resistor which could prevent this. Another modification was the Londex "controlled maintenance" unit. This kept the shock current down to a few milliamps, and prevented resetting by an operator after an earth fault trip.

MR C. F. FREEMAN (Courtaulds) mentioned that in connection with insulated neutral systems, American work had shown that if a variable resistance type of fault (arcing ground) existed, the voltage on the other lines could rise to several times the expected value. Experience had demonstrated this, several

motors in a works having this type of system burning out at the same time during a fault.

MR J. COWAN (H.M. Principal Electrical Inspector of Mines) discussed portable tools for use in mines and quarries. He felt that 25 V was useful when there was any serious danger of shock. Considerable use had been made of circulating current monitoring in mines, but difficulty had been experienced because the circulating current was greater than could comply with intrinsic safety requirements.

In connection with protection generally, the increasing use of flameproof equipment in non-mining industries had to be borne in mind. For these, pilot circuits had to be intrinsically safe. The problem of finding a satisfactory solution was becoming acute.

MR N. C. B. CARRICK (I.C.I.) spoke as an engineer in the chemical industry. He felt that the author had shied away from the conclusions suggested by his own physiological evidence. The 50 V centre tapped system was a safer arrangement than 110 V, which was satisfactory when conditions were fairly dry but not otherwise. He did not find that the components of a 50 V system needed to be over-large. 1 kVA to 2·5 kVA step down transformers cost only 10 to 15% more than the 110 V equivalents. All in all, going to 50 V is unlikely to involve a big expenditure.

MR G. E. SKILLINGTON (Unilever) thought that it was unreasonable to expect managements to install 110 V systems and then find that they did not give absolute safety. His solution was to bolt hooks 9 in. from 240 V socket-outlets, for the purpose of hanging 240/50/25 V teak cased compound filled step down transformers. The socket-outlets should be changed to the scraping earth type. Most of the transformers should be of 500 VA rating, and would weigh 25½ lb. The author overstressed voltage drop difficulties. Against this could be set the greater ruggedness of 50 V tools and higher power factor.

MR S. W. ECKETT (Nalder Bros.) described the Nalder protection unit. The Metrosil unit mentioned by Mr Emmerson acted to prevent the peak value of voltage on the tool frame from exceeding 30 V for 10 amp prospective current, or 100 amp on 100 V. The unit was available in a d.c. form.

MR C. A. M. THORNTON (I.C.I.) spoke of the safety of 50 V d.c. welding supplies. He went on to say that his establishment could not dispense with 240 V sockets because the supply was needed for certain instruments not manufactured for other voltages. On 50 V systems, there seemed a very small difference in price from 110 V system as regards apparatus up to the socket-outlets, including transformers; less than 5%. Mostly 1 kVA transformers were used in fixed positions, feeding 20 to 40 sockets each. In four years experience, he had met with no trouble due to transformer breakdown.

MR H. W. PUTTICK confirmed on the basis of his experience in India that a three-phase unearthed neutral system did not give the safety from shock that might be expected, because one phase was usually down to earth.

MR D. B. HOGG (I.C.I.) was convinced that nothing higher than 25 V to earth was safe. There was no real advantage in 110 V, and it was very dangerous.

International Domestic Standards

SAFETY requirements for electrically operated domestic appliances provide the subject for the latest publication of the International Commission on Rules for the Approval of Electrical Equipment (C.E.E.). This specification, like others issued by the Commission, has no automatic validity in individual countries; nevertheless, as a recent B.S.I. information sheet points out, it provides a useful guide to the requirements of approval authorities on the Continent, and it is therefore of interest to British manufacturers.

The specification, known as C.E.E. Publication 10, is split into two parts, the first covering general requirements, and the second dealing with specific appliances. Only the first is considered here.

Three classes of appliance are recognised. I, an appliance intended to be earthed; II, an appliance which has no provision for earthing because it is all insulated, double insulated, or provided with reinforced insulation; and III, an appliance intended for use on extra low voltage. There is a symbol for Class II which has to be marked on the appliance nameplate; and a particular requirement that capacitors shall not be connected to accessible metal parts on Class 2 appliances.

Considerable attention is given in the Specification to motors and protection. It is required that all motors shall start when connected to 0·8 times rated voltage, and that if the starting current will blow a 6 amp fuse, the rated current of the appropriate fuse shall be marked on the appliance. The test for this last characteristic involves 10 starts at 0·8 times rated voltage, and 10 at 1·1 times, using a specified open wire fuse. In general, for appliances rated at 300 W and over, the input must not differ from the rated value by more than 15%; there are larger tolerances for lower ratings.

Temperature limits for the various sections of appliances are laid down, there being some slight differences from those specified in B.S.816. Overload protection is required, in general, to operate within one hour on 1·2 times the current flowing at rated voltage.

Maximum leakage current is specified at 3·5 mA for stationary appliances supposed to be earthed in normal use, with other values for differing conditions. Insulation tests at 500 V d.c. are called for, with a minimum value of 2 megohms. High voltage tests of 1,500 V for Class I appliances, up to 4,000 V on Class II and of 500 V on Class III are specified.

For the purpose of checking endurance, each appliance is energised at 1·1 times and at 0·9 times rated voltage for periods of 48 hours. It is then started 50 times at 1·1 times and 50 times at 0·85 times rated voltage, each period of connection being at least thrice the time from start to full speed. 5,000 starts at 0·85 times rated voltage are required for appliances with centrifugal starting switches, and thermostats are caused to operate 10,000 times. In such tests, the effective length of any motor brushes must not, in general, be reduced by more than 40%.

Cord Grips and Flexibles

Cord grips are required for all non-detachable flexibles, the test being 100 pulls of one-second duration, with a force of 1 kilogram. At the end of the test, the maximum displacement permissible is 2 mm. If the appliance is moved during normal use, a guard against excessive bending of the flexible is required. There are additional requirements concerning mechanical strength generally, and a test is prescribed in which the appliance is subjected to impacts of 5 kg-cm with a hornbeam hammer. The blows are aimed at the weakest parts of the enclosures, including handles and levers.

Many other detailed requirements occur in this document, and as already stated, they are amplified in the particular requirements section. The specification can be obtained from the B.S.I., price 9s.

Diesel-Electric Locos for Brazil

THIRTEEN 1,000 h.p. diesel electric locomotives are being supplied by the English Electric Co. for passenger and freight services on the metre gauge system of the Rede Ferroviara do Nordeste, formerly the Great Western of Brazil Railway. The diesel-electric equipments are being built by the E.E. Co. and the mechanical parts by Vulcan Foundry. Of the A1A-A1A type—having two three-axle bogies in each of which the outer axles are powered—these locomotives are also equipped for multiple unit operation. At present, the intention is to operate these locomotives on the Central line from Recife to Afogadas de Ingazeira (250 miles) and on the Southern line to Maceio (216 miles). While the primary function of the locomotives is the haulage of passenger trains, they will also be used to assist in the movement of heavy seasonal crops.

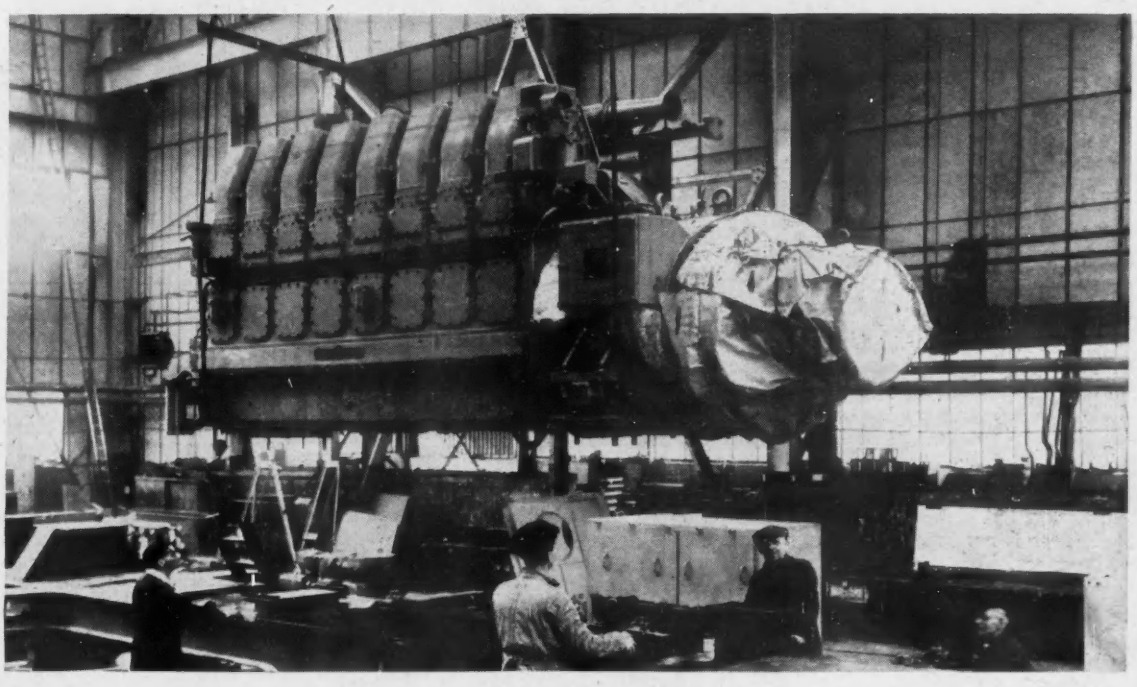
Maximum gradients on the R.F.N. are 1 in 40, and the sharpest curves are of 260 ft radius. The new locomotives are, however, able to make a return trip over either of the two lines without refuelling.

The locomotive is of the bonnet type and consists of five compartments separated by bulkheads. Behind the nose compartment is the full width driving cab, in which there is a driving position for either direction of travel and behind the cab are the engine room, radiator compartment and compressor compartment. Motive power is provided by an English Electric 8 SRKT diesel engine with main and auxiliary generators, forming one unit, supported at three points on resilient mountings. Normal rating for the engine is 1,000 b.h.p., but to meet the conditions of high temperature and humidity prevalent in the operating part of Brazil, it has been de-rated to 874 h.p.

Starting is achieved by motoring the main generator from a 48 cell, 123 Ah (5 hour rate), lead acid battery, housed in two containers mounted on either side of the locomotive running plate. The six-pole traction generator is itself a direct-current, self-ventilated, single-bearing machine, with its frame bolted to the flywheel housing of the diesel engine. At the non-driving end, the frame is machined to receive an end-shield to which the frame of the overhung auxiliary generator is bolted.

The bearing for the armature shaft is situated at the non-driving end of the main generator, and a tapered extension shaft accommodates the armature assembly of the overhung auxiliary generator. The main generator has a separately excited field winding and there is, in addition,

In this picture the diesel engine is being lowered on to the sub-structure of the locomotive



a series winding which is used when the generator is connected to the battery for cranking the diesel engine.

An automatic voltage regulator controls the output from the auxiliary generator at 110 volts, and this output supplies excitation for the main generator, control circuits, blower and exhauster motors and the locomotive lighting and battery charging.

Traction Motors

Two traction motors are mounted on the outer axles of each bogie. They are series wound, six-pole forced-ventilated machines. Two stages of automatic field weakening are employed, provided by divertor resistances, to enable constant wheel tread horsepower to be obtained throughout the required speed range. The traction motors are permanently connected in two parallel groups of two motors in series. Grease-lubricated roller bearings carry the motor armature and shafts, while the axle suspension bearings are oil lubricated. Single reduction spur gearing is interposed between the traction motors and the wheels.

Control

The bulk of the control equipment is housed in a control frame mounted across the locomotive adjacent to the driving cab, and access to most of the equipment can be obtained from the cab by removing dustproof covers held by quick-action catches. Contained in the frame are the electro-pneumatic contactors and reverser, together with the electro-magnetic contactors and associated relays.

At either driving position, a master switch, control handle and brake valve are provided, together with an instrument panel and indicator lights. The instrument panels are provided with indirect illumination.

In driving the locomotive, the following sequence of operations is carried out. First the diesel engine is started by moving the master switch to the "engine only" position and then pressing a starting button. To move the locomotive, the master switch is moved from the "engine only" position to select the appropriate direction of travel. An initial movement of the control handle causes the reverser to be thrown to the pre-selected position, and the motor contactors to close, thus connecting the traction motors to the main generator. At the same time, a small current is fed to the main generator field thus providing sufficient tractive effort to enable the locomotives to be manoeuvred at the low speeds required during coupling up. Further movement of the control handle causes fuel injection to be gradually increased, though the diesel engine continues to run at minimum speed. Still further movement of the control handle, however, progressively increases the engine speed up to the maximum.

After the initial movement of the control handle, the excitation of the main generator field is automatically controlled to ensure that the generator output at all times matches the available engine horsepower, irrespective of engine or locomotive speed. With this type of control system, the diesel engine makes the minimum number of revolutions for a given output. Field weakening of the traction motors is obtained automatically as a function of the regulator controlling the generator field excitation, and is thus also independent of diesel engine speed. Up to three locomotives may be coupled together and driven in multiple from one cab.

With 25% adhesion, the starting tractive effort is 27,000 lb, and at 12 m.p.h. a continuous tractive effort of 20,400 lb. is available. Maximum speed is 60 m.p.h. and the leading dimensions of the locomotive are: weight, 71 tons; length, 50 ft 3½ in.; width, 8 ft 10 in.; and height from rail to roof, 12 ft 3 in.

H.E. Power/Population in Canada

THE annual review of developed water powers in Canada during 1953, just issued by the Dominion's Water Resources Division, adds information to that which we published on 4th February. There is, for instance, the table, set out below, which indicates the total hydraulic installations in each province or territory in relation to the population. Not surprisingly the province of Quebec, which is second in population, and has large power-consuming industries such as aluminium production and pulp and paper manufacture, tops the list with the largest installed generating capacity and also the highest rate, 1,808 h.p. per 1,000 population.

Yukon and Northwest Territories, with very sparse populations, but with a relatively heavy power demand from gold mining, show an abnormal rate of 1,298 h.p., which is not truly comparable with those of the provinces. British Columbia, with a comparatively small population, ranks second among the provinces in *per capita* installation, with 1,217 h.p., chiefly due to the large quantities of power required for its mining, metallurgical and forest-product industries.

Sixth in population, but fourth in total installed capacity, Manitoba has an average installation of 886 h.p. per 1,000 population, but it must be remembered that a large part of the power is consumed in the industrially-important city of Winnipeg.

Ontario, which has the largest population, is second in total hydraulic installation, which may surprise some. The comparatively high rate of 812 h.p. per 1,000 population in Newfoundland is due principally to the large pulp and paper installations there, while, coming still further down the scale, it will be recalled that in Alberta and Saskatchewan the hydro-electric plants are located largely in the northern parts of the provinces, somewhat remote from the present main centres of population which are served chiefly by thermal electric stations. Prince Edward Island has only minor water-power resources which accounts for its low rate of hydro-electric installation.

Total Canadian Hydraulic Installations in Relation to Population

Province or Territory	Installed Capacity h.p. (1953)	Population (1/6/1953)	Installed h.p. per 1,000 population
British Columbia	1,496,518	1,230,000	1,217
Yukon and N.W.T.	32,440	25,000	1,298
Alberta	207,960	1,002,000	208
Saskatchewan	109,835	861,000	128
Manitoba	716,900	809,000	886
Ontario	4,006,685	4,897,000	818
Quebec	7,719,122	4,269,000	1,808
New Brunswick	164,130	536,000	306
Nova Scotia	162,433	663,000	245
Prince Edward Island	1,900	106,000	18
Newfoundland	311,150	383,000	812
Totals	14,929,074	14,781,000	1,010 (average)

Finally, the average h.e. power per thousand population throughout Canada is 1,010 h.p., being second only in that respect to Norway. But although the total turbine installation at the end of 1953 is given as nearly 15 million h.p., less than 23% of available resources have been developed. During last year 638,012 h.p. of new capacity was put into operation. Of the hydraulic plants 90% serve as central power stations, that is they give a public supply.

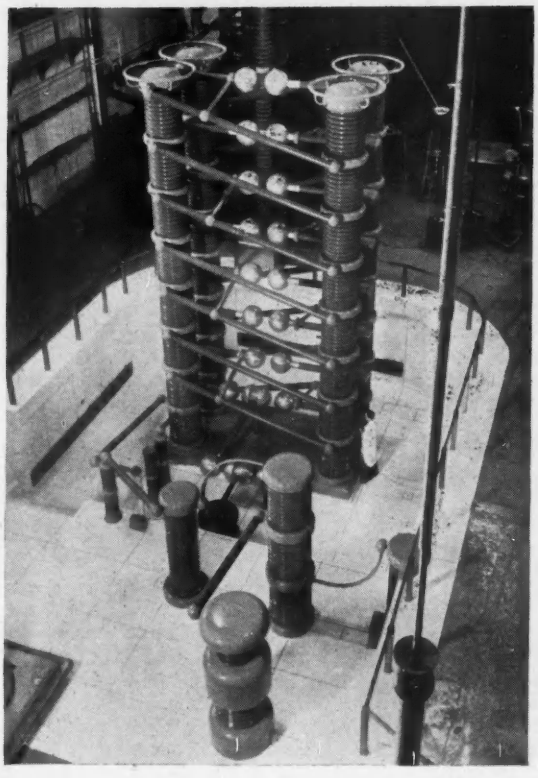
SURGE TESTING AT HIGH VOLTAGES

New 3·2 MV Plant at the National Physical Laboratory

THE increasing use of high voltage transmission, in this country and abroad, has brought in its train a requirement for testing equipment which will be able to prove insulation and protective equipment behaviour under conditions similar to those liable to be encountered in operation. The major hazard to overhead line systems is, of course, lightning, and in consequence, such proving tests require to simulate the transient voltages which may be induced.

The only effective limit to these voltage surges, is, at the moment, provided by the presence between the line and earth of some electrically weak point. To test associated equipment, it is therefore necessary to provide voltages of the type produced by lightning. That implies surges of single polarity rising to the limit in about one microsecond and falling to half value in about 50 microsecs. This type of wave is well known to the industry as a 1/50 wave shape. Such voltages are generally produced by the Marx type impulse generator, in which a number of condensers is charged in parallel through high resistance from a d.c. source and is then automatically connected in series by the breakdown of air-gaps set to the appropriate values. Thus the output of the generator is the charging voltage multiplied by the number of stages.

This photograph shows the plant in its 8 ft deep pit



For many years the National Physical Laboratories has possessed a Marx-type machine with an open-circuit voltage of some 2 MV and a total stored energy of 20 kW-sec. In the past this has served its purpose well. Recently, however, it has become apparent that this plant was becoming inadequate not only due to the increase of voltage on the Continent, where 380 kV is coming into use, but also because some of the components were beginning to show signs of deterioration after many years of hard service. It was also desired to embody the experience gained, in apparatus more convenient in use and better adapted to the present and future needs of the laboratory.

Flashover on a long insulator sling

New Equipment

To meet the requirements, it was therefore decided to install a new surge generator of a size limited only by the available laboratory space. This machine, believed to be the largest in the country, has an open circuit voltage of 3·2 MV and a stored energy of 77 kW-secs, values that should be adequate for some time to come. The Ministry of Works carried out the whole project, including the civil engineering work and the auxiliary services. They worked in close co-operation with Messrs Ferranti Ltd., of Hollinwood, who were awarded the contract for the equipment, and with the N.P.L. staff, whose special experience has been embodied in the design and development of the generator. The capacitors used by Messrs Ferranti Ltd. in the construction of the generator, were supplied by B.I.C.C. Ltd.

Eight stages are incorporated in the machine with a maximum stage voltage of 400 kV. This is provided by a transformer and voltage regulator, with a metal rectifier in a voltage doubler circuit. The primary equipment can produce the 400 kV required, with an adequate margin and with either positive or negative polarity. Each stage consists of two capacitors in separate porcelain housings, the total stage capacitance being 0·12 microfarad.

The eight stages are assembled into a four-column structure, the capacitors of each column being spaced by porcelains similar to those which house the units themselves. The generator is provided with internal charging, discharge and damping resistors, while other resistors for discharge and damping are mounted externally. The inter-stage spark-gaps have as electrodes spheres 50 cm in diameter, and the gap spacing is controlled from and indicated at the operating desk. An external bank of capacitors constitutes a permanent capacitance load on the generator, and is the high-voltage section of a capacitance voltage divider for the measurement and recording of the generated surges. Provision is made for controlled electrical firing of the generator once it has been charged to the correct voltage, and for tripping high-speed cathode ray oscillographs before the generator itself is discharged.

Progress in Radio Research

Report for 1953 Details Work on Propagation and Materials

PROPAGATION of short wave radiation continues to exercise the facilities of the Radio Research Board. In their report "Radio Research 1953" (H.M.S.O. 1s. 9d.) details are given of this work with particular reference to propagation by means of the ionosphere. The question of low frequency waves has by no means been neglected, and the investigation of coastal effects on phase change with distance has been continued during the year. This study is of considerable theoretical interest and also has a direct bearing on the ultimate accuracy of certain types of radio aid for marine and air navigation. Further measurements have also been made over land using a new phase measuring system, which was developed for work over sea and which offered certain advantages over that previously used on land paths.

The work on the transmission of surface waves along a single conductor has also been continued, and has been concerned with three new aspects of the problem: measurements at a wavelength of 12·8 cm. on guides consisting of dielectric coated wires; measurements at a wavelength of 3·2 cm. on corrugated metal guides, and an analytical and experimental investigation of the behaviour of a conducting helical guide. The attempts made to launch a surface wave over a guide consisting of a helix of enamelled copper wire with a lay of about ½ in. proved unsuccessful, and a mathematical analysis of the problem showed that the E.H. mode associated with such a guide cannot be supported as a standing wave, although it should be possible to satisfy the requirements of a travelling wave.

Ionospheric Work

Various applications, particularly long-distance communication for which the high frequency spectrum (3-30 Mc/s) is especially suited, depend on the properties of the ionosphere. The major influence determining ionospheric weather is radiation from the sun, and the (at present) unpredictable fluctuations in this radiation mainly limit the accuracy of the forecasts. Other errors, however, arise in the condensation of the basic data from the ionospheric observations to provide a reasonably small number of charts providing forecasts of world-wide conditions, and these errors are under close investigation.

With a view to providing direct observation on propagation conditions over long ranges regular measurements have been made at Slough of the angle of elevation of the various signal components arriving from a pulsed transmitter at Colombo operating at 16·16 Mc/s.

Valuable information about particular aspects of the problem of solar influence on the ionosphere was obtained on the occasion of the solar eclipse of February 1952. The results showed that the component of radiation responsible for ionisation in the F layer was not emitted uniformly from the solar disc, but was particularly intense from the eastern and western limbs where radiation of the green coronal line was enhanced. Changes in the F layer were of a complex nature and are still under examination.

The irregularities in the ionosphere have an effect on direction-finding where it is necessary to rely on reflection from the layers. The small-scale roughness results in diffuse reflection and experiments have shown that rapid bearing fluctuations arising from wave interference phenomena have a standard deviation of less than 1° for normal E and F reflections. Means of reducing these wave-interference errors were investigated and as a result the averaging of observations taken over a period of ten seconds or so has been found to be generally sufficient to smooth out bearing fluctuations of this class.

Materials

The study of point-contact and alloy junction germanium diodes has continued through the year with particular attention devoted to the current-voltage-temperature characteristics and to the noise spectrum at reverse voltages. Comparison of experimental data with existing theories shows that the latter require extensive modification in the case of the point-contact rectifier since the simple metal-semiconductor barrier model hitherto used is far too idealised.

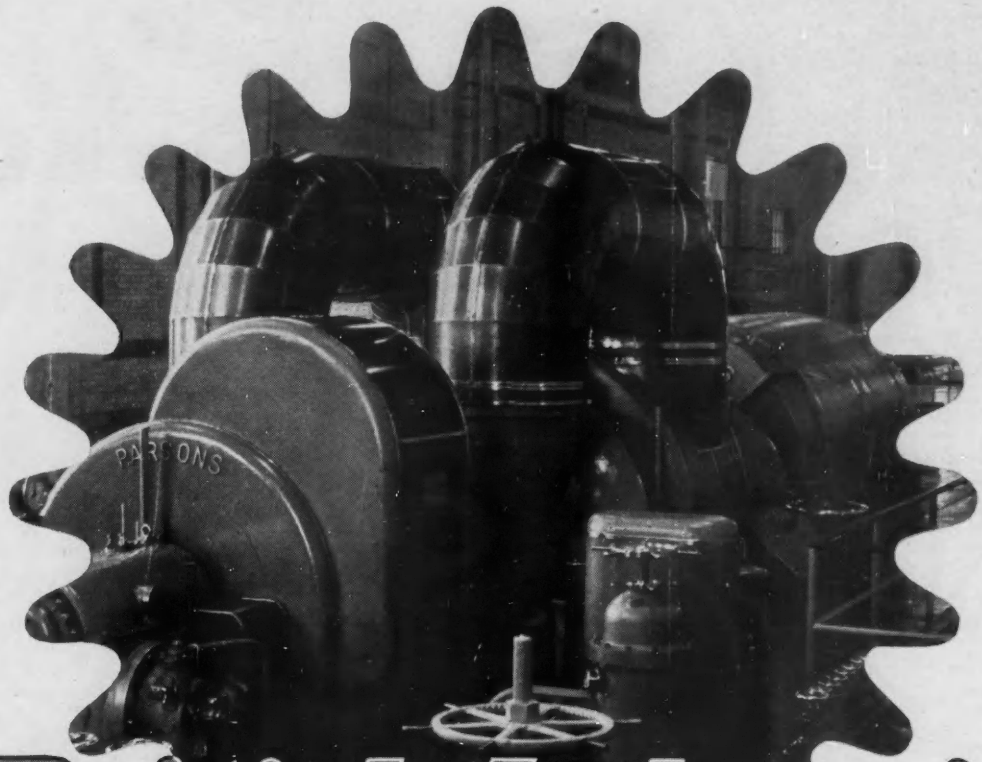
In this investigation, monocrystalline germanium was used, and the diodes were hermetically sealed. The disagreement between experimental results and theory was sufficiently great to cause a different attack to be made and from this was derived a basis of interpretation of the forward and reverse characteristics as well as of the square wave response of the reverse current. The appreciable decreasing component of current, with a time constant of the order of one millisecond, can be explained in terms of a readjustment of the occupancy of the traps in the transition region on the application of a reverse voltage. This theory is elaborated in more detail in the report.

As was described in previous reports a contract has been placed with Imperial College to carry out a research programme aiming at the establishment of a closer correlation of magnetic and dielectric properties of a material with its chemical nature and lattice structure. During the review year, work has continued on the preparation of polycrystalline aggregates and of a few single crystals of spinel-type and related ferromagnetic materials, and on the preparation of ferromagnetic ferrous sulphide phases.

Dielectric Research

The primary object of the research being carried out on artificial dielectrics at Imperial College is to produce a medium with a rapid change of refractive index with frequency. The use of a prism made from such a medium in conjunction with a frequency modulated transmitter, provides the possibility of scanning with a radiated beam at high speed. A desirable feature for such a medium is that its effective impedance should be the same as that of free space. A preliminary study has indicated that a medium of this type can be made by building a three-dimensional array of resonant conducting obstacles, or by spacing non-resonant obstacles at approximately half the wavelength being used.

To investigate further properties, it has been decided to build a spectrometer, operating at a wavelength of 1·25 cm. This is a straightforward adaptation of optical techniques, and is contained within parallel plates of four foot diameter. The design has been completed and the instrument is being made in the College workshops. A conventional frequency-stabilised oscillator, using a klystron and resonant cavity has been completed and is working well.



British Industries Fair

1954

CASTLE BROMWICH
EARLS COURT, LONDON
OLYMPIA, LONDON
MAY 3—14: 9.30 AM—6 PM.

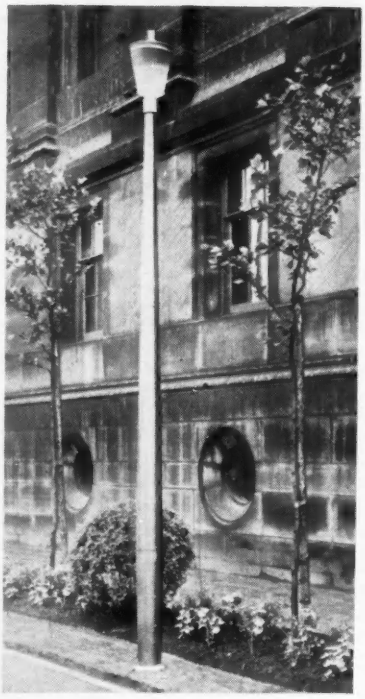
F

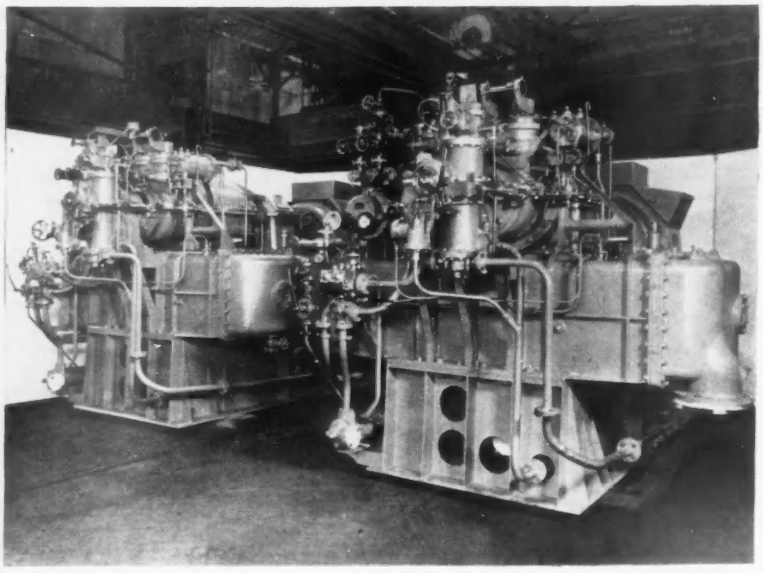
BIF electrical section exhibits at

Details of manufacturers' displays

PROBABLY the first noticeable difference at this year's Castle Bromwich section of the British Industries Fair is the absence of many of the electrical manufacturers. Large and small organisations alike have decided against exhibiting and readers will note that such familiar names as the British Thomson-Houston Co., Metropolitan-Vickers Electrical Engineering Co., Ferranti, Premier Electric Heaters, Metway Electrical Industries, to name but a few, are missing from the stand descriptions which follow. Nor is the exodus confined solely to electrical firms—many engineering firms (International Combustion; Richard, Thomas and Baldwins; Armstrong Whitworth are typical examples) are similarly absent. In fact, comparing catalogues for the two years, some 370 firms represented last year in the four sections at Castle Bromwich are not exhibiting, whilst some 150 new firms may be seen in a total of exhibitors which exceeds 1,000.

Despite this decreased interest in the B.I.F., many firms in the electrical sections are still using the Fair as a medium in which to introduce new items, providing evidence that this event is still regarded in some quarters as a useful avenue for publicity. Apart from new items, many familiar products are being displayed, ranging from domestic appliances to marine auxiliaries. Interest from overseas is considerably marked, indeed, the initial response to invitations was higher than for a similar period at any time since the war. It is anticipated that, overall, some 125,000 overseas visitors will have bought goods at the three centres of the Fair by the time it closes. As last year the Fair is open from 9.30 a.m. to 6 p.m., starting Monday, 3 May, and closing Friday, 14 May. For the benefit of readers who will be visiting Castle Bromwich we give in the following section an alphabetical pre-view of manufacturers' exhibits.



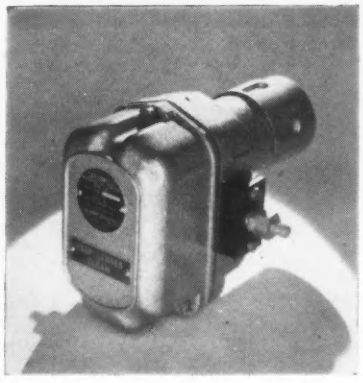


On the left is seen the G.E.C. 550 kW marine auxiliary geared turbo-alternator which generates at 440 V, 400 c/s. Above, Poles "Beta" column, a 25 ft pole for Group A lighting

Birmingham

at Castle Bromwich

Left, the Satchwell type LER photo-electric flame failure control for oil-fired boilers and above, a 6·6 kV switchboard by Yorkshire Switchgear which was supplied to a Government Department



Accles and Shelvoke

The supply engineer's attraction on this stand lies in the "Acvoke" cable spiking gun, now stated to be gaining increased popularity in the supply industry. Using blank cartridges of a type exempt from the Firearms Act, 1937, the gun provides a rapid and effective method of making cables dead. With the aid of a lanyard operating the firing pin release mechanism, the operator may work in complete safety. D. 323.

Airscrew Co. and Jicwood

Being displayed on this stand are axial flow and centrifugal fans for various applications, industrial blowers and cooling tower fans. D. 728.

Aiton and Co.

Pipework for h.p. steam provides an interesting display, a particular exhibit being austenitic steam piping, 9 in. bore by 1·56 in. thick designed for maximum working conditions of 1,665 lb/sq in. and 1,070°F. It is shown plain bent, and having attachments welded on. D. 608.

Assn. of British Chem. Manufrs.

A score of leading chemical firms, each having separate display units, provide the electrical engineer with plenty of scope in which to discuss chemical products used in the electrical industry. From silicone rubbers on the one hand to capacitor impregnants on the other, for its electrical interest alone, this exhibit covers a wide range of activities. C. 617/516.

Amplec Ltd.

Both round and squared shaped electric washboilers are the main feature on this stand. These appliances being available in plain galvanised and a range of enamelled finishes. Making its debut is an electrically operated washing machine. Its agitator is triple vaned, having a full half-circle movement driven from a gearbox. C. 303.

Auto Diesels Ltd.

Examples of this firm's standard range of generating and lighting equipment feature generator sets specifically designed for contractors' use. Of particular note is a dual voltage, dual frequency unit, capable of providing a supply at either 400 V, three-phase 50 c/s or 230 V, three-phase, 60 cycles. Outdoor 1229.

Bakelite Ltd.

From a wide range of plastics on show here, with emphasis given to their applications, new moulding materials to be seen include phenolics and polystrene modified with rubber to improve its impact strength, glass filled materials and alkyds. Bonding resins displayed on the stand indicate the variety of applications whilst polyester resins and laminated sheet provide a show of their own. C. 404.

H. J. Baldwin and Co.

Here again the supply engineer sees much of interest in the standard range of cable protection covers, conduits and pre-cast concrete materials. Newcomers to the show are fencing materials which, in "kit" form, provide standard unit construction media for substation and other fencing purposes. On the domestic appliance side is shown an extensive variety of "Wireohms" heating elements, whilst de luxe models of their "Thermat" electric blankets and pads are also to be seen. C. 513.

Bastian and Allen

Featured on the B. and A. stand this year are two entirely new, totally enclosed electrode steam boilers, both of which are in operation. Available for loadings of 30 kW and 70 kW, they give steam output of 100 and 230 lb/hr respectively. Other water heating plant on show includes a standard "Bastian" electrode steam boiler and an electrode hot water boiler suitable for space heating and thermal storage plant. C. 711.

Bayliss, Jones and Bayliss

Of particular interest in this display of iron work and general forgings is the range of transmission line equipment manufactured by this company. Outdoor 1325/1224.

Belmos Co.

This Scottish switchgear firm's exhibit displays examples from their range of air-break switchgear and automatic motor control gear for both industrial and flameproof applications up to 650 V. For the p.f. conscious manufacturer, there are some new designs of control cubicle, one of which is a six-stage automatic power factor correction installation. C. 415/314.

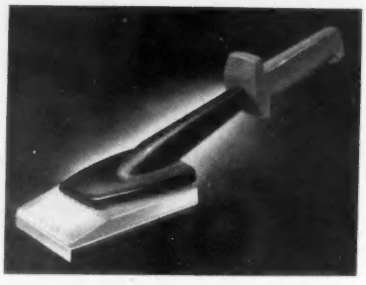
Berry's Electric

With all its advantages over other forms, electric space heating is emphasised this year. In particular are seen a range of period reproduction models, whose new heating element assemblies, modified to conform to relevant British Standards, are stated to be now more efficient. Moreover, by virtue of these modifications disguising the heat source even more successfully than with the old canopy reflector, the fires are somewhat enhanced in appearance. C. 507/406.

Keith Blackman Ltd.

Of the 16 "Tornado" fans shown on this stand, two excite interest in that they are being shown for the first time. Foremost of these is a 16 in. type APA ring mounted propeller-axial unit designed to

A striking view of the Standard Telephone and Cable Co.'s portable microwave transmitter in position on the roof of Senate House for first relay link of the Coronation TV relay to the Continent. Below is shown the "Westair" climatiser (Westool) cnd the prototype of Osborne's electric paint scraper



give exceptionally quiet operation under free air or light resistance conditions. The use of only three blades, each of pressed steel curved anticlastically, is stated to give the quietness of operation for this size of fan. D. 521/418.

Borax Consolidated

Here, the centre of attraction is a powder-type hand cleanser being demonstrated for the first time at the B.I.F. Known as "Boraxo," the cleanser is claimed to combine the efficiency of a heavy duty cleanser with the mildness of baby soap, being stated to remove grease, grime and chemicals from workers' hands with high efficiency. D. 718.

F. W. Brackett and Co.

An industrial size central flow band type water screen is one of the exhibits to be seen in operation, among a display of types of continuous water screening equipment which may be employed at power stations, waterworks, sewage outfalls and factories. Apart from screens, several small water pumps are also on show. D. 345.

Geo. Bray and Co.

The display of heating elements on this stand gives indication of the range available, whilst the insulator department show electro-ceramic insulators and refractories. In this section, the company specialise in small ceramics made to close tolerances in different materials to meet requirements for the manufacture of cathode ray tubes, thermionic valves, resistors and capacitors. C. 519/418.

Geo. Burn Ltd.

For the installation engineer, this company show a full range of electrical conduit, manufactured to the relevant British Standards together with a variety of brass, copper and steel tubes. B. 309/208.

Brit. Vac. Cleaner and Eng. Co.

Equipment for the modern home is seen in "Goblin" appliances on shown here. For the kitchen there is a the 4 lb wash capacity washing machine designed for the smaller type rooms, whilst the model G.59B domestic cleaner with its 500 W motor is one of the most powerful available to ease the housewife's daily round. C. 313/212.

Brook Motors

Extensions to both ends of this firm's motor range provide exhibits to interest both heavy plant and powered appliance manufacturers. In the larger size is seen a 350 h.p. motor having a drip proof enclosure in which loose louvres over the ventilation ports in each endshield may be rotated through 90° to give drip proof protection in any mounting position. Cartridge bearing housings which enable the motor to be dismantled without disturbing the bearings are another of its special features. C. 304.

Bulpitt and Sons

For those whose concern is primarily the domestic market, the company are again displaying "Swan Brand" domestic electric appliances, foremost among which is their range of electric kettles, claimed to give the widest choice of models, capacities, finishes and loadings. C. 506.

B.K.B. Electric Motors

Sharing a stand with their associates, Bulpitt and Sons, this firm exhibit representative examples of electric machines they manufacture, emphasising the use of a power supply from engine driven alternators, particularly where a mains supply is not available. In the motor range single-phase machines up to 1½ h.p. and t.p. machines up to 7½ h.p. are being shown together with d.c. motors from ½ to 25 h.p. in size. C. 607.

Chance Bros. Ltd.

For water supply from borings are being shown a number of submersible electric pumps whilst the display includes electric generating plant and switchgear and lighting equipment. B. 309/208.

Campbell Engineering

Working models of "Hotway" electric water heater and hot water shower unit demonstrate the ability of electricity with this type of unit to provide instantaneous hot water. Control of both water flow and heating element is effected by a single knob, thus ensuring that the element is energised only whilst water is flowing. A. 328.

W. Canning and Co.

On two stands, the specialist concerned with metal and plastics finishing may inspect a broad cross-section of Canning's activities in this field. Demanding close attention is the latest type of hydraulic-electric automatic plating plant, 35 ft long and in operation mechanically. D. 207/108 and 209/110.

Carter and Co. (Nelson) Ltd.

Heating specialists will find among the range of electric unit heaters from 1½ to 15 kW a flush mounting unit heater available for either 1½ or 3 kW loading on show for the first time. Another aspect of this company's activities is seen in their display of sirens, ranging in size from ¼ to 20 h.p., which includes the 4/5 h.p. Home Office type. C. 203.

C.A.V. Ltd.

For the electrical engineer, interest on this stand centres round the electrical equipment being shown for commercial and passenger vehicles and industrial agricultural and marine engines. Representative types of generators and electric starters are shown, the latter including the 6 in. diameter "Axial" model suitable for transport, marine and heavy industrial diesel engines. A new type designed for use on agricultural tractors and vehicles with medium sized oil engines is also displayed. C. 501.

Chemical and Insulating Co.

Heat insulating materials for use in power stations include the 85% magnesia insulant whilst the Darlington Insulating Co. show the facilities they offer for cold store insulation. Ipscol Ltd., another subsidiary, demonstrate their latest type of equipment for automatically controlling combustion. D. 541/438.

Chilton Electric Products

The growing interest in core balance protection is reflected in the display featuring the Chilton core balance circuit-breaker which is designed for use on the smaller installations. Supplementing their 30 and 60 amp range of voltage operated earth leakage c.b.'s, this unit is aimed at protecting circuits in which earth leakage exists of sufficient magnitude to cause fire but not accompanied by an appreciable rise in voltage. C. 606.

Clang Ltd.

Featured in this display of electrical accessories is a range of 5 amp and 15 amp weather proof plugs and sockets with solid brass bodies. Although these accessories have already been supplied to many large users they have not been, until now, included in the company's general range. Of particular interest to marine engineers and manufacturers for use under wet and damp conditions, the range exemplifies special components for which the company can accept orders. C. 210/311.

Clegg and Coupe

Many redesigned features are seen in the firm's Model HN boiling type, "Prefect" domestic electric washing machine, one of the principal exhibits on this stand. A major development lies in a new, double trip bar release, reversible roller, wringer, which is styled on similar lines to the present model, which, introduced in 1949, was selected by the Council of Industrial Design for the Festival of Britain. B. 222.

C.M.A.

This year, this Association of seventeen leading cable manufacturers has broken away from its former type of exhibit and is featuring cables used in industry, transport building and communications. Cable samples are arranged around enlarged coloured transparencies illustrating the particular theme, more complex cables being "stepped" to show their construction. As a whole, the stand provides a representative cross section of members' cable products. C. 216.

E. K. Cole Ltd.

The plastics division is well represented at this year's Fair, exhibits demonstrating the wide range of plastic mouldings produced by "Ekco." A. 320.

Cooper and Co. (B'ham.)

For the electrical engineer, interest centres in the Cooper-Croid method of fixing plant to concrete flooring without the use of bolts and hence without grouting or damage to the floor. The method employs Cooper's felt and Croid No. 65 machine fixing glue, providing a base claimed to have a holding power of 50 lb/sq in. and to reduce vibration transmission by 85% over conventional fixing methods. D. 138.

Copper Development Association

As a useful reminder that copper and its alloys are fully available for unrestricted use, the C.D.A. have covered the main surface of their stand with 7 in. sq tiles of copper, brass, nickel silver and gilding metal to demonstrate the attractive colour finishes of these metals. A small projecting screen displays a sculpture in copper sheet of contrasting tones with illustrations showing uses of copper. D. 232.

Concordia Wire and Cable Co.

Electric wires, cables and flexibles manufactured by Concordia are displayed with many types of insulation ranging from enamel to paper. Other sides of their activities are seen in bare and insulated resistance wire, cord assemblies and insulating varnishes. C. 740.

Dale Electric

This outdoor stand displays examples of their diesel and petrol engine driven generating plant which this year includes a new 1,250 W diesel unit. Outdoor. 1336

Desoutter Bros. Ltd.

Prominence is again given to the series of $\frac{1}{2}$ in. and $\frac{3}{8}$ in. two speed electric tools which feature a two speed gear box making it virtually two tools in one, whilst the tools are of the lightest and most compact manufactured. A new close corner drill is one of several new tools on show, this supplementing the existing types M.2 and M.3. It is capable of drilling 5/16 in. dia. holes in steel to within 17/32 in. of the inside face of the right angle. C. 412.

Diesel Equipment Ltd.

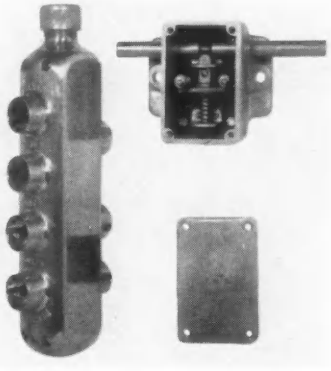
On show for the first time are two new lines, one being a range of close-coupled petrol engine driven generators for both a.c. and d.c. supplies. The other comprises an 11 kW generator, driven by an air cooled diesel engine. C. 728.

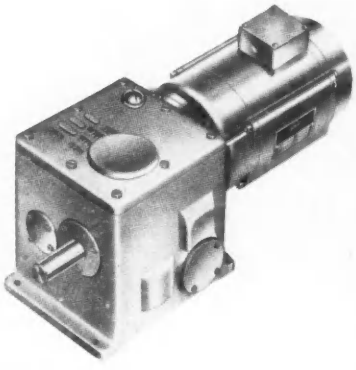
Dimplex Ltd.

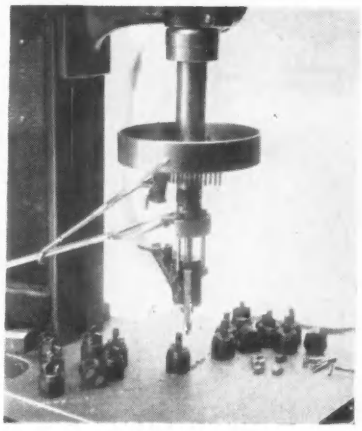
Heating engineers whose concern is the installation of heating apparatus in areas where a high surface temperature is dangerous will find radiators on this stand to satisfy most requirements. For use in hospital operating theatres and similar places is a range of gastight radiators, whilst their flameproof types find useful application in spray booths, petrol stations and like situations. C. 715.

Donovan Electrical

Included in the display by this firm of switchgear manufacturers are a.c. direct switching starters for motors up to 75 h.p. in size, automatic star-delta starters

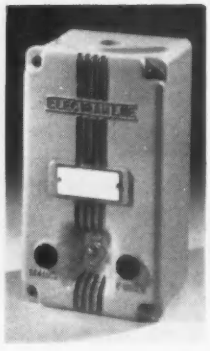






Top, left, W. Wilkinson's pendant remote control push button switch for large machine tools, right the Ether temperature controller type 221. On the bottom is shown, left, Hillman Motors F.H.6 heavy duty geared t.p. motor and right Russell Bros. autofeed magazine screwdriver

G.W.B. Electric Furnaces new "Powermaster" packaged oil gas fired boiler and below Electran's low voltage lighting unit for use on machine tools



and other types. Representing their manufactures of distribution equipment is a comprehensive display of heavy duty ironclad switch and fuse gear and a length of their "Runtact" enclosed o.h. busbar ducting suitable for feeding hoist blocks, cranes or portable tools. C. 417.

Doulton and Co.

Most striking feature of the Royal Doulton Potteries' display of electrical porcelain insulators is their use in the stand construction to demonstrate the general mechanical functions performed in service. Four stacks of heavy duty post insulators for 132 kV service support the tubular steel "roof" of the stand from which a raised reception area is hung by five strings of suspension insulators used on 132 kV and 275 kV lines. Two rural distribution poles show pin type and shackle insulators whilst other exhibits feature stoneware transformer tanks and bushings and the blast tube used in 275 kV circuit-breakers. C. 410/511.

Easiclene Porcelain-Enamel

Being demonstrated on this stand is their compact electric washing machine which is fitted with a power driven agitator and a 10 in. wringer which folds away after use. Associated with this appliance is their "Easipump" unit powered from the mains water supply which empties any type of washing machine, such as their own, which has a gravity-drawn emptying hole. The pump, being introduced for the first time, may also be used for filling or emptying other receptacles. B. 522.

E.D.A.

Applications of electricity to industrial finishing forms the principal theme of this year's joint E.D.A./M.E.B. stand. Emphasising the importance of integration of finishing processes, the display represents a product receiving initial cleaning, drying, spraying, stoving and finally, counting, each process being applied to a conveyor system. Equipment supporting this display includes immersion heater, industrial blower, electrostatic paint spraying and infra-red drying units. Special features show barrel electro-plating, and a high-vacuum coating machine used in the motor accessory industry. C. 509/408.

Electran Coil Winding and Trans. Co.

General recognition is now given to the desirability of operating portable lighting units and power tools from low voltage supplies and to this end the low voltage safety lighting unit being shown by Electran is eminently suitable. Also to be seen is a range of power, radio and instrument transformers, a.c. and d.c. solenoids and other examples of their activities in the winding field. C. 219.

Electric Construction Co.

Of the four main exhibits on the E.C.C. stand one of the most interesting is a totally enclosed, pressure ventilated Ward-Leonard drive which is electronically controlled. Finding extensive application to machines in which rapid speed control and response is required, as in hosiery drives, this unit is provided with a d.c. motor and foot-brake so that interested visitors may investigate the response and control obtained with the unit. C. 708.

Electric Depot Ltd.

Prominent on their stand is the display of local lighting units for industrial use, whilst cable racks, hangers and other supports indicate another aspect of their activities. C. 725.

Electro-Chemical Eng. Co.

For manufacturers concerned with metal finishing this firm are demonstrating their new development "Zeromist" for chromium plating. Added to existing chromium plating baths, this material is claimed to eliminate spray thus removing the necessity of providing fume extraction whilst eliminating any loss of chromic acid by this means. Stated to produce no breakdown products, "Zeromist" reduces the surface tension of the solution, thus reducing dragout losses. C. 609.

Electromagnets Ltd.

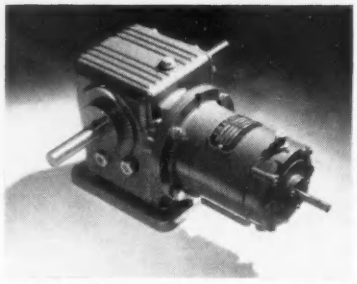
Among several new exhibits on show is a control system for lifting magnets which provides a fine control of the amount of material picked up or dropped by a lifting magnet. Known as the "Select-O-Load," the system gives control from zero to full lift without the use of series resistances and hence is suitable for such applications as cupola charging where it is required to pick up or discharge comparatively small amounts or iron of varying grades. C. 605.

Electro Mechanical Manuf. Co.

For the industrial installation specialist this firm display an indoor, "Y" pattern, fuse switchboard employing 400 amp oil immersed circuit-breakers of the vertical isolation, horizontal drawout type. Also on view are their new all-isolating, cubicle type, motor starter boards which feature removable doors on which units contactor are mounted. C. 419.

English Electric Co.

This year's English Electric stand is devoted to fuse and switch gear motors and instruments. In the foremost category are seen representative examples of fuse switchboards including "Superform" dis-boards and isolators and substation



F.H.P. Motors' model C.70 geared unit can be supplied for speeds down to 0·25 r.p.m.

equipment. On the switchgear side is displayed an F.600, 400 V, 25 MVA switchboard incorporating a 1,600 amp type OB.3 and a 600 amp OB.2 air break circuit-breakers. Examples of industrial and f.h.p. motors and a selection of instruments complete the display. C. 510.

Ether Ltd.

As in previous years, the Ether exhibit features electronically operated instruments for temperature measurement and control among which the "Thermal-trol" unit, utilising the Wheatstone Bridge principle is on show for the first time. To complete the display are solenoid and diaphragm operated control valves suitable for use on oil, steam, gas, air and water up to 300 lb/sq in. pressure. C. 700.

H. Fisher (Oldham) Ltd.

Making the weekly wash-day work a lighter task, the chief exhibit on this stand is an entirely new model washing machine, being introduced to the trade at the Fair, details of which are not yet available. Apart from this attraction, the company display their standard lines of "Autohome" washers, and associated equipment including the rotary ironer attachment. C. 602.

Fisher and Ludlow

Half of this stand of domestic washing accessories is devoted to a display of the "Bendix" automatic washing machine, both domestic and commercial models being shown. For the housewife, the "Bendix" offers completely automatic operation after switching on, clothes being washed, rinsed three times and spun damp-dry before the machine switches itself off. B. 517/416.

Follsain-Wycliff Foundries

For power station use are examples of ports fabricated from "C.Y." abrasion resistance alloy for use in pulverised fuel and ash handling plant. For metal parts exposed to high temperatures they have their "E.V." heat resisting steel for dumper bars, baffle plates and mild steel. "Penetral" treated for superheater tubes and tube supports. D. 709.

Foster Transformers

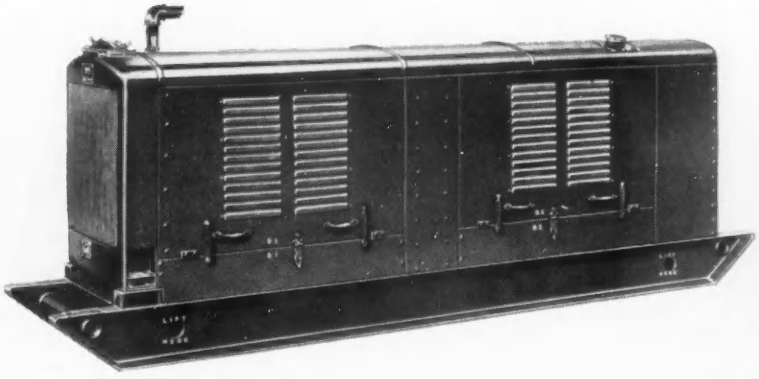
Foster's display of high voltage, constant voltage and instrument transformers and voltage regulating equipment is seen this year in the Scientific and Optical Section of the Fair at Olympia. Among the automatic voltage regulators being demonstrated is their recently introduced electronic constant voltage transformer which is particularly suitable for providing a constant voltage source from a supply of widely changing frequency, supplying a variable load. B. 37 (Olympia).

Fractional H.P. Motors

Among this display of series, shunt, single-, two- and three-phase, shaded pole, capacitor and synchronous motors and geared units is seen a recent addition is their range in the model C.70. Supplied for use on d.c. or single- or three-phase a.c. supplies, this unit is stated to give outputs ranging from 250 lb/in. at 0·25 r.p.m. to 200 lb/in. at 12 r.p.m. C. 721.

W. T. French and Son

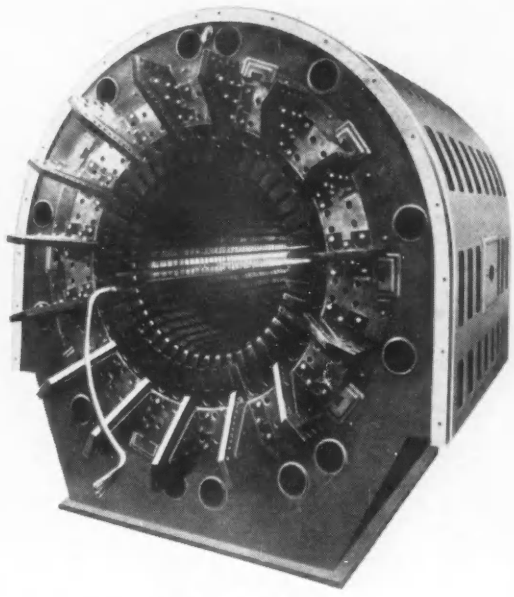
As in previous years, a comprehensive display of "Mysto" domestic electric appliances forms the centre of attraction for the electrical visitor. Of particular note is their bowl fire, which with a copper bowl, has proved a popular item this season. For those whose taste is for the modern "streamlined" effect, the "Countess" double bar element, 2 kW fire, will excite attention, whilst there are irons, kettles and boiling rings to complete the display. A. 605.



G.E.C.

Emphasis this year is given to marine electrical engineering, exhibits ranging from a 550 kW marine auxiliary geared turbo-alternator set to such marine accessories as lighting fittings, fans and telephones. The generator set, complete on a combined bedplate, is of the type being supplied to Shell Tankers Ltd., being a multi-stage impulse machine running at 6,500 r.p.m. from steam at 485 lb/sq in. (g.), 790° F. at t.s.v. coupled through reduction gears to a t.p., 440 V, 60 c/s, 1,200 r.p.m. drip-proof alternator. Beneath the turbine, mounted directly on the baseplate is a 1,100 sq ft cooling surface condenser complete with air ejector to maintain a vacuum of 28·5 in. (g.) when supplied with cooling water at 1,250 gal/min, 75° F. A main switchboard and group starter board for marine use on 440 V three-phase supplies is also shown. C. 503/402.

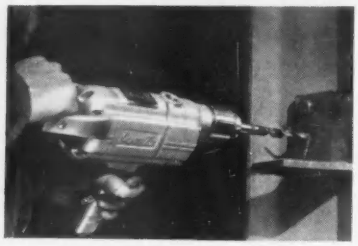
"Permali" winding support ring and bracket system fitted to a 30 MW generator stator, (by courtesy of the English Electric Co.)



Gent and Co.

This firm of electrical and horological engineers show a range of clocks—including a new 6 in. diameter size—available in both mains operated, synchronous and electric master clock controlled types. Associated with their master clock system is a waiting train movement for tower clocks and electronic chiming and striking equipment which is shown together with an automatic, one-hand operated, time recorder and a programme instrument which automatically actuates signals for start and cease work. By way of contrast, a newcomer is seen in a miniature buzzer which, battery operated, produces a high frequency note and transformer operated, a medium pitched tone. It may be operated by the two sources of supply to give both notes at will. C. 407.

Auto Diesels show their 45 kVA totally enclosed alternator for contractors' use (above) and right, Electromagnets new p.m. floor sweeper



Desoutters' new corner drill gets close into corners of angle sections

G.W.B. Furnaces

In a stand devoted entirely to steam raising plant, among which are seen "Autolec" electrode type steam raisers and water heaters, emphasis this year is given to their "Powermaster" oil or gas-fired boiler, a completely self-contained, packaged type, unit. Available in sizes ranging from Model 15, 517 lb/hr to Model 500 17,250 lb/hr of steam, the boiler is supplied ready interpiped and interwired. C. 821.

Hale and Hale

Among castings in "Blackheart" malleable iron, and "Permalite"—a special purpose alloy designed for hard wear and resistance to shock and abrasion—on show by this company, are seen castings for o.h. power transmission and power station equipment including boilers, stokers, valve gear and heavy flameproof switchgear. D. 609/508.

Hampson Industries

New additions to their diesel and petrol engine driven generator sets being shown on both indoor and outdoor stands include a range of portable petrol engine driven flange mounted d.c. battery charging units from 500 to 1,500 W rating. On show for the first time are diesel driven rotary arc-welding generators ranging in size from 150 to 500 amps. C. 702/Outdoor, 1312.

G. A. Harvey and Co.

From their heavy construction and fusion welding shops, which specialise in the fabrication of pressure vessels ranging in size from 3,000 lb working pressure autoclaves to fractionating columns 220 tons in weight, this company are also showing examples of their general production from steel plate varying from 5/16 in. to 6 in. thick. B. 329.

L. G. Hawkins and Co.

Of particular value for the one-roomed bachelor is the "Ovenette" a revolutionary type of cooker being shown for the first time. Somewhat like a large pressure cooker in appearance, this appliance employs annular channel heating elements located round the inner edge of the lower half outer case. C. 403.

H.E.C. Compressors and Engines

In addition to pumps and compressors exhibited in previous years, the company are showing a new unit in Model 40 a single cylinder 4 in. by 4 in. compressor having a displacement of 21·5 cu ft/min for pressures up to 200 lb/sq in. For manufacturers producing plant with compressed air units, as in machine tools, several special units are available, particularly to Model D.S.B., comprising a ½ h.p. electric motor direct coupled to a 2½ cu ft compressor. D. 739.

Higgs Motors

Special attention is being drawn to the company's new range of totally enclosed, fan cooled motor designed in accordance with B.S. 2083 and to their single- and three-phase self-regulating generator designed for operation without the use of automatic voltage regulators. Representing their comprehensive rotating machinery ranging from ¼ to 1,000 h.p. are examples of standard foot, flange and vertical mounting and f.h.p. motors. C. 601.

Hillman Electric Motors

Consisting entirely of f.h.p. motors for all purposes, this exhibit displays the new "Speedmor" sewing machine motor of 1/5 or 1/6 h.p. Another machine being featured is the F.H.5 permanent capacitator type geared motor available in speed outputs ranging from 1 rev/hr to 600 r.p.m., made in aluminium the motor is designed for interchangeability of gear boxes. One of its important applications lies in the field of electronic calculators. C. 223.

Hilmor Ltd.

For the electrical industry, hand-operated, hydraulic and motorised tube bending machinery on show here has one major application in installation work. Particularly suited for large factory work is the rotary hydraulic machine No. 3 having a maximum capacity of 2 in. conduit. For the smaller sizes, the popular "E.L." series, requiring no bolting down, handles up to 1¼ in. conduit. D. 147.

Hymatic Engineering Co.

On their outdoor stand, Hymatic are demonstrating several of their efficient air compressors in operation, the smallest being their Model 303, which is delivered as a complete spray painting outfit. For installation work there is the lightweight air driven hammer, type P4107 which, with a striking rate of some 100 blows/sec, consumes only 3 cub ft/min at 80 lb/sq in. Outside 1354.

I.C.I.

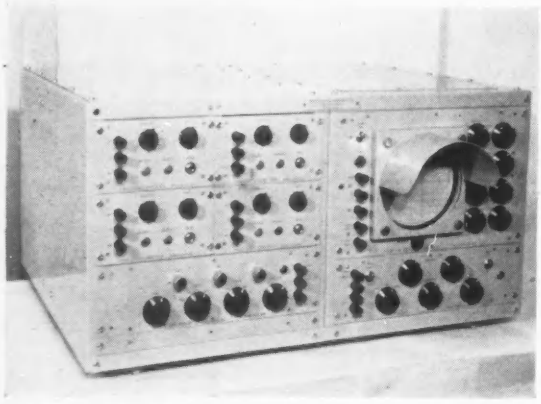
With three stands devoted to specific divisions of the organisation and a share in the A.B.C.M. Stand, I.C.I. are well represented at Castle Bromwich. Much interest will centre on the "Terylene" stand where are displayed the potentialities of this future plastic "maid-of-all-work." Metals are displayed in considerable diversity, showing many electrical applications. D. 409/308/619/520.

Industrial Fan and Heater Co.

Of special interest in this display of fan units are their "Resista" models fabricated entirely from p.v.c. for use in chemical fume-laden atmosphere where the corrosive nature of the air is deleterious to conventional metal fans. A new item is seen in a wet separator for use with dust collecting plants in which dust is collected outside the separator. D. 315/212.

Industrial Pyrometer Co.

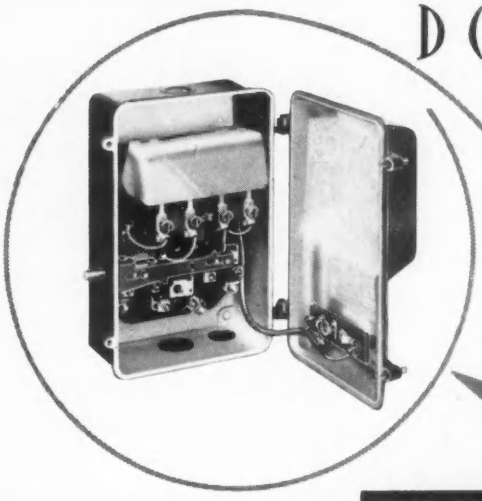
Sharing a stand with their associate companies—H.J.S. Industrial Instruments Ltd., Industrial Control Valves Ltd., and the Nottingham Thermometer Co., Ltd.—this firm exhibit indicating, recording and controlling pyrometers which include multi-point instruments for diesel engines, paint drying ovens and similar applications and special pyrometers for molten metal and surface contact temperature measurements. C. 734.

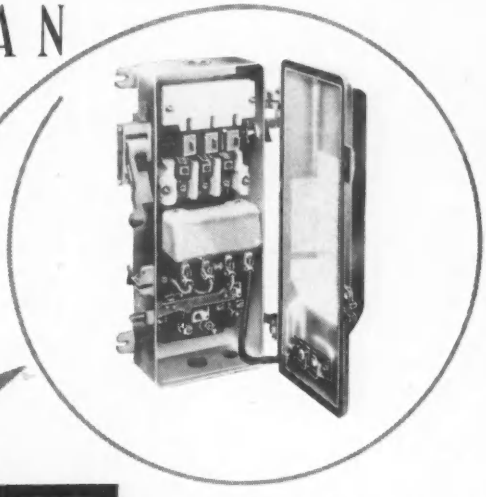


Top, left, Clegg and Coupes model HW boiling type "Prefect" washing machine

Southern Instruments Four Channel Oscillograph

DONOVAN





Here is our Type A.30 Size 1 Contactor Starter suitable for squirrel cage motors up to 7½ h.p. which require under-voltage and tamperproof over-current protection. Larger sizes available.

THE *AUTOMATIC* CHOICE FOR A.C. DIRECT-SWITCHING CONTACTOR STARTERS

Here is our Type A.32 Size 1 Starter (consisting of an A.30 Size 1 Starter with an isolator in the same case). Easily operated isolating switch ensures safety. It is fully shielded and able to break the stalled motor current in emergencies. Either thermal or magnetic overcurrent releases as specified.

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at the

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RECONDITIONING OF ELECTRIC MOTORS • DYNAMIC BALANCING
MANUFACTURE OF ELECTRIC MOTORS, RESISTANCES, FIELD AND ARMATURE COILS
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MODEL TL1. A strongly-built machine recommended for Hotels, Schools, institutions, large houses, etc.
MODEL T23X. A compact but powerful general-purpose machine for factory use. Cyclone top to prevent clogging or for wet floors.
MODEL TL2. Specially designed for use in Cinemas where a narrow machine is required for use between rows of seats.
MODEL T87. Designed for cleaning Lancashire and other large boilers, furnaces and Gas Works retorts. Handles heavy smouldering dust.

Langley London Ltd.
Of major interest to the industry are samples of plain tubing and parts fabricated from silicone bonded, glass fabric tubing, a material having high temperature resistance and low moisture absorption properties. Also on view is their display of insulating materials in mica and laminated plastics. C. 226.

Lansing Bagnall Ltd.
Newcomers to the materials handling equipment being shown here are seen in the FD 223 diesel fork truck and the SFS 225 stand-on straddle fork truck, which is electrically powered. Designed to handle 40 in. by 40 in. pallets, the latter has 38 in. standard forks, is only 48 in. wide and 56 in. long and can lift 2,500 lb to a height of 10 ft 10 in. With power taken from an "Exide" battery, its maximum speed is 4½ m.p.h. C. 628/727.

Lawler, Ayers and Co.
Here is being shown the complete range of "Laco" pipe bending machines. Of special interest for the electrical industry being their model LH100, an hydraulic unit bending ⅝ in. to 2 in. diameter conduit to an angle of 90°. Not only can the machine be supplied as a standard unit for 90° bends but a special bending attachment together with formers are available to enable 180° return bends to be made. D. 104.

Legg (Industries) Ltd.
Designed for use with all types of electric vehicles and trucks are battery charging units being shown here, of particular note being an oil-cooled unit suitable for operation in humid or fume laden atmospheres. Also displayed are transformers up to 250 kVA in size, rectifying equipment for all purposes, garage charging units and accessories. C. 325.

Lewis Spring Co.
As engineering developments grow in complexity, spring manufacture demands early consultation on design. As an indication of this company's ability to give expert technical advice and meet individual requirements, the range of coil springs, pressings and wire forms being shown covers almost every type of problem they have had to overcome. D. 421.

R. A. Lister and Co.
The smallest (Model PL 6) of the three power loaders on show is being displayed for the first time, this unit being suitable for lifting cases, bales or crated packages from ground to lorry level or stacking goods to a height of 6 ft. The other examples are the 16 ft and 24 ft models, all three being powered by a 400/440 V a.c. three-phase motor fitted with a reversing switch. D. 205.

Londex Ltd.
In a display covering the greater part of the Londex range of automatic electrical control apparatus, two recently introduced relays are on show—a triple pole 60 amp mercury switch contactor and an electronic relay, model CCR. Process timers are set up for demonstration; they include a number of synchronous motor-driven units and others of the short interval type. C. 722.

London El. Wire Co. and Smiths
Together with their associates, Frederick Smith and Co., the Liverpool Electric Cable Co., and the Vactite Wire Co., Ltd., the "Lewcos" organisation is again showing a comprehensive range of bare and insulated conductors. Copper and resistance wires, "Anacos" copper alloy wires, o.h. transmission cables and "L.E.C." rubber, thermoplastic, paper and cambric insulated cables are a few of the products to be seen. C. 717.

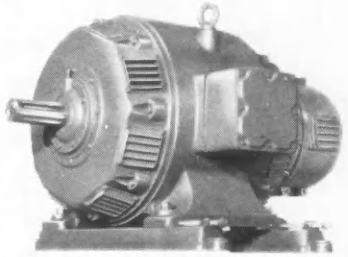
Wm. McGeoch and Co.
Satisfying a wide diversity of tastes and requirements, electrical accessories on this stand range from front and back of board mounting switches to lighting fittings for marine craft of all types. For exterior or damp situations are seen watertight switches, plugs, sockets and couplings in standard and multi-pin patterns and watertight and weatherproof lighting fittings. C. 515.

McKechnie Bros. Ltd.
As an indication of the ever-widening ramifications of this organisation, the MKB stand is larger than in former years, showing extruded rods and sections in brass, bronze, nickel silver and copper. Another interesting display features copper sulphate, electrolytic copper powder, copper cathodes and "Lithopone," whilst an exhibit of "Spider Brand" and other solders completes their range of manufactures. D. 500.

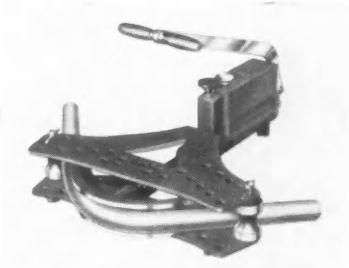
C. and C. Marshall Ltd.
In this display of plastic extrusions for industrial uses, emphasis is given to the company's ability to produce extrusions to customers' requirements. To this end are featured the "Cronapress" electric bell push and a new departure in window-sealing sections. C. 712.

A. C. Morrison (Engineers) Ltd.
Of the comprehensive range of engine driven generating sets being demonstrated at this outdoor stand, four are being shown for the first time. All are diesel engine driven, ranging in size from the 1,250 W, 230 V, 50 c/s belt driven machine powered from a Petter PAZ 2½ h.p. engine to a 10 kVA, 230 V, 50 c/s Brush "Square Path" alternator driven through a flexible coupling by a Lister FR2, 16 b.h.p. engine running at 1,500 r.p.m. Outdoor 1326.

National Plastics (Sales) Ltd.
In the thermostatic range of mouldings marketed by this organisation comes a newcomer in the "Solo" solder gun, housed in "Diakon" mouldings and made for Budd and Weston (Special Machines) Ltd. For broadcasting are seen a large t.v. cabinet and small radio cabinet, whilst doors and trays for refrigerators, electrical accessories and battery boxes indicate the variety of products for the electrical industry. C. 614.

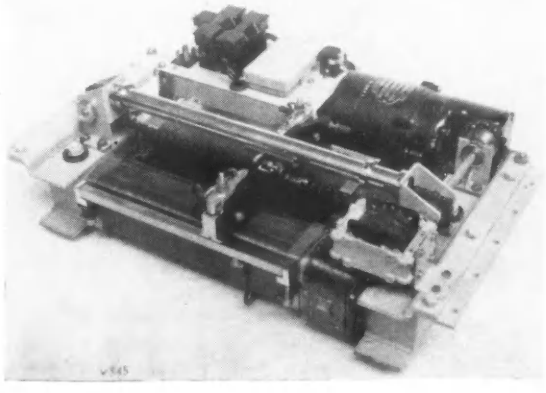


This new type large 350 h.p. drip proof motor is by Brook Motors Ltd.

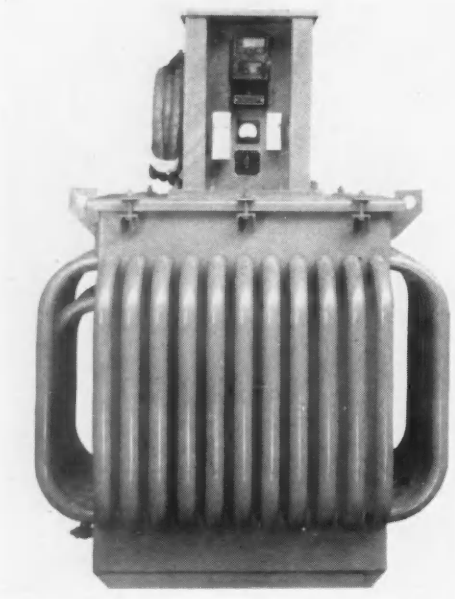


A rapid bend tube bending machine by Lawler Ayers

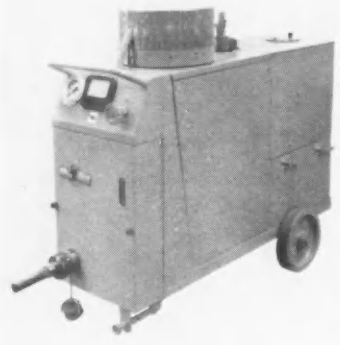
Above, an Airflo p.v.c. fan by Industrial Heater Co. Ltd.



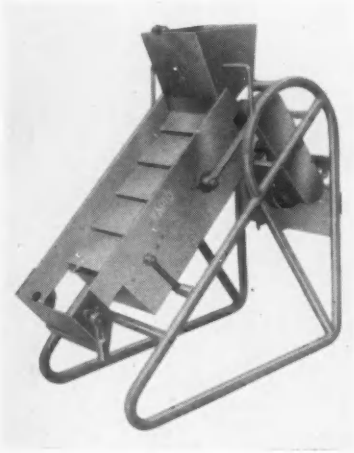
Right, 2 kVA straight type slider automatic voltage regulator by Foster Transformers



Legg Industries feature this oil-cooled vehicle charger



Bastian and Allen Ltd. built this "Speedylectric" high pressure steam jet cleaner rated at 20 kW, whilst below is a type "V" vibratory electromagnetic separator for the treatment of fine powders by Rapid Magnetic Machines Ltd.



National Time Recorder Co.

Where large numbers of female staff are employed on an hourly basis, the conventional procedure of "clocking on and off" can be both time wasting and clumsy for personnel who invariably have one hand occupied carrying handbag. To overcome these difficulties the "Autoclip" recorder is available which makes its time recording at the drop of the time card. Four models are available, giving such extra facilities as two colour ribbon printing and daily change of column. C. 608.

Newton Bros. (Derby)

Electrical equipment being shown by this firm includes automatic carbon pile voltage and current regulators, rotary transformers and converters and high frequency alternators. A. 327-226.

New Welbeck Ltd.

Featured in this display of industrial vacuum cleaning equipment is the "Bak-Vak" portable cleaner introduced earlier this year. With a casing manufactured from aluminium and specially shaped to fit the curve of the back, the unit is carried by the operator without difficulty, to provide a means of cleaning ledgers and other dust traps at high levels normally inaccessible. C. 208.

Oldham and Son

With a possible theme of "Ancient and Modern," this firm of lighting specialists display, in bizarre contrast to their recent developments, a historic collection of lighting units going back to a Davy lamp of the pattern in use almost a century ago. Much of their display of modern equipment features portable fittings to meet requirements of personnel who work in the hours of darkness. C. 414.

Osborne Manufacturing Co.

Being introduced to the market at Castle Bromwich this year is an electric paint scraper which, incorporating a 750 W heating element and stainless steel scraper, should find many applications for both exterior and interior decorating. Operation from scaffolding platforms and similar places should be facilitated as only one hand is required to use it. C. 323.

Permali Ltd.

Visitors to this display of insulating materials find two new grades of "Permali" on show, of which the Grade TH is of particular interest for high voltage applications. Specially designed for use in the tropics, or operating conditions of high humidity, it possesses properties of high mechancial and electric strength similar to those of standard Grade EH "Permali" whilst having substantially improved moisture resistance. C. 618.

Phipps Plastic Products

Fabricators of thermoplastic sheet material such as "Perspex," this company display a range of products of interest to manufacturers of lighting fittings, accessories, machine tools and many others. C. 713.

Poles Ltd.

One of the most popular columns manufactured by this company—the "Adastra" is to be seen serving some of its many uses from flagpoles to h.v. transmission poles. Constructed in tapered sections all of which can be housed in the base section 6 ft 6½ in. long, this pole is readily transportable whilst having a high strength to weight ratio after erection. Outdoor. 1333/1232.

Power Centre Co.

Many installation requirements are satisfied in the display of installation equipment set out here, items ranging from busbar trunking to switchboards. Of particular interest are cable trunking sections produced in surface, floor, and underfloor forms for special applications. C. 505.

Pyrotenax Ltd.

Examples of mineral insulated copper covered cables on view include both standard patterns used for power and lighting installations and special cables evolved for space heating and thermo-electric applications. Suggested methods of employing this cable for rising mains in blocks of flats and similar buildings are also displayed. C. 720.

Ransomes, Sims and Jefferies

It is on the outdoor stand that exhibits of particular importance to electrical engineers are being shown, in the display of electric fork lift trucks. Three types may be inspected, ranging in lifting capacities from 10 cwt to 2 tons. Various attachments are also shown, including load and overload guards, 4 ft. 6 in. extensions, a crane attachment and the "Hydrum" load clamp with drum arms. Outdoor. 1317/1216.

Rapid Magnetic Machines

In this display of permanent and electro-magnetic equipment is seen a new addition to their swarf separators alongside the standard and special units designed for dealing with more complex swarf and scrap. Again being demonstrated is their portable foundry separator used for removing brads, gaggers, risers and other ferrous content from foundry sand. C. 421.

BUSBAR CHAMBERS

available from
100 amps. — 2000 amps.
— in —
2, 3 and 4 bar
assemblies
together with complete
range of Circuit Clamps.

QUALITY PRODUCT

KEEN PRICES
QUICK DELIVERY

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OTHER PRODUCTS: Busbar Trunking: Cable Trunking: Cable-Tap System: Rising Main System: Fuse Units: Fuseboards: Switchfuses: Switchboards & Accessories.

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3-14 May
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BIRMINGHAM
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Staffs.
'Phone: Wednesbury 0507 (PBX) 'Grams: "Powcent, Wednesbury"
LONDON OFFICE: Wellington House, 125/130 Strand, W.C.2. 'Phone: Temple Bar 1743

SETTLE for NETTLE

Nettle Shockproof Electrical Wiring Accessories are being used extensively on schemes large and small. This is because Nettle have for over a quarter of a century specialised exclusively in perfecting the design of all types of shockproof electrical wiring accessories for industrial and domestic installations. In addition to a very wide variety of lampholders, flush and surface type A.C. switches, plugs and socket-outlets, bell transformers, handlamps, weatherproof couplers, rubber-clad weatherproof sockets and plugs, etc., there is a complete range of ring main accessories. Our specialist engineers are available for consultation without obligation.

Ref. ZO 2014. Flush Switch to suit Plaster Depth Boxes. One or two way.

Ref. SF 1230. Switched Socket-outlet, Shuttered Flush Fitting.

Ref. 4. Pendant Lampholder, Porcelain Interior with H.O. Ventilated Skirt.

Ref. Y 73. Combined Plug and Batten Holder, Two or Three Terminal, 2" Screw Centres.

The Nettle Catalogue contains details of the full range of Nettle Shockproof Electrical Accessories. You are invited to write for a copy.

NETTLE ACCESSORIES LTD.
HARPER ROAD · WYTHENSHAWE · MANCHESTER

See these NEW products—Stand D.338—B.I.F.

H.3. Hydraulic Bender Stand.
Fabricated in steel tubing and fitted castors on two front feet for easy handling in the workshop. Weight of Stand (less metal tray) 14 lb.

Pipe Screwing Bench.
Fabricated in steel tubing. Kerung timber top and 'H' frame roller assembly. Lightest construction retaining maximum rigidity. Special design bracing for carrying on shoulder. Ample clearance for doors, etc.

H.3. Hydraulic Bender Stand.
Fitted flanged feet for site work. Stands raise bender enabling double sets to be achieved without restriction. Detachable metal trays available for both models.

TUBE BENDING MACHINES AND EQUIPMENT

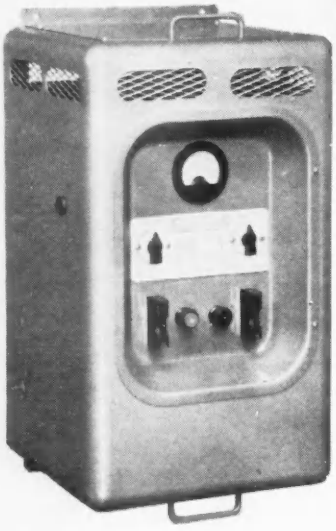
Tubela

STAND No. D.338 B.I.F. BIRMINGHAM

TUBELA ENGINEERING CO. LTD. · FURZE STREET · BOW · LONDON · E.3

The NEW BATTERY CHARGERS now available

BIF Castle Bromwich BIRMINGHAM May 3rd - 14th See us on STAND C508



...and everything about them is right. Price—design—performance and delivery. A charging rate for any industrial requirement can be found from this extensive range that covers outputs from 12 to 2400 watts. They are reliable and efficient and of robust construction and yet streamlined and attractively finished in hammer green. Recessed control panels containing meters, switches, fuses and terminals reduce possibility of breakages. Components are of the best possible—double-wound vacuum impregnated transformers and **double-voltage Westalite rectifiers.** Ballast, either resistive or reactive, depending on output, is incorporated to stabilise the charging current. Transformer control of charging rate eliminates wasteful resistances and effects the utmost economy.

For further details of this completely new range of **DOUBLE VOLTAGE**

WESTINGHOUSE WESTALITE BATTERY CHARGERS

write for a copy of our new publication B.C. to

Dept. E.T.7. WESTINGHOUSE BRAKE & SIGNAL CO., LTD., 82 York Way, King's Cross, London, N.1

Rawlplug Ltd.
When labour costs form such a large proportion of installation finances, time savings become a matter, at times, of necessity and to this end, the "Durium" drill evolved by this company proves an invaluable asset, over and above its value in cutting down much of the arduous labour involved in masonry boring. Visitors wishing to judge for themselves the merits of this tool are invited to carry out tests on brick and concrete walls. C. 707.

Ray Engineering Co.
On the composite stand on which members of the Bristol Engineering Manufacturers Association are participating, this company contributes examples of work carried out in three sections of its activities. For the electrical engineer are displayed exhibits of their switchboards and switchgear indicating type and quality of these products. D. 201/100.

Revo Electric
As in previous years, this company's exhibit takes the form of street lighting columns, complete with lanterns, mounted at each entrance to the Fair. Examples range from the "Scopas" column in polished concrete carrying a new type "Sol-etern" lantern for three 80 W fluorescent lamps for group A roads to the "Angelo" column with the "Hatfield" lantern, utilising sheet steel, vitreous enamel canopy-reflector and "Kleenprism" refractors, for group B roads.

Rheostatic Co.
Automatic temperature control equipment shown here includes a number of new sizes of valves to extend an already comprehensive range. Suitable for control by thermostats, these valves may be used in liquids, ovens and ducts. In the case of space heating, control is effected by a compensator measuring outside weather temperature. C. 500.

Rozalex Ltd.
Considerable use is now made of "Rozalex" barrier creams in protecting the skin and guarding against occupational dermatitis and apart from the usual display of these products the company also show their "Rozalex" dispenser designed to give a controlled, economical and uncontaminated supply whenever required. For personnel in contact with synthetic glue and resin, a new barrier cream is being shown for the first time. D. 706.

Russell Bros. (Redditch)
Here the feature is the auto-feed screwdriver which provides a means of fixing wood and other screws on a mass production basis. All parts are mounted on and actuated by one central spindle, making it completely self contained so that it can be removed from the drilling machine at will. C. 205.

Geo. Salter and Co.
Dominating their display of industrial weighing equipment is a 12 ft high spring balance type crane-load weigher, which, weighing more than six tons itself, is designed to take loads of up to 200 tons. In all, this company has three stands, showing spring balances, springs, roller bearings, grey iron castings and examples of the "Salterpale" pre-packaging. A. 407/306. D. 328 and 343/238.

Sciaky Electric Welding Machines
Particularly important in present day efforts to ensure a high industrial power factor is a new development of the type PA 50/150 multiple projection and cross wire welding machine stated as having a power factor of 0·9. Performing a large number of welds simultaneously in wire mesh, the transformer and tee-slot platen arrangement minimises the secondary loop thus giving a high electrical efficiency. C. 222.

Serck Tubes
Having now considerably augmented its production facilities, the company is marketing an increased tonnage of condenser tubes and tubes for other purposes in a range extending from 1/16 in. to 3 in. diameter and up to 50 ft in length. Material varies from copper, 70/30 brass and Admiralty brass to copper nickel, phosphor bronze and aluminium. A number of smaller type primary and secondary surface heat exchangers are also shown. D. 618.

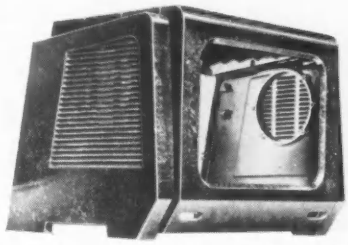
Southern Instruments Ltd.
Where oscillographic records have to be made on site, facilities for developing and fixing can rarely be provided. On show on this stand, however, is a particularly useful apparatus for this purpose, the type M732 auto-developer which processes such records under daylight conditions. Although specifically designed for their "Minirack" c.r.o.'s and recording cameras, the developer will develop, fix and dry any length of paper record from a few inches up to 200 ft, in widths up to 120 mm for a total demand on a 200/240, 50 c/s supply of 1·3 kW. C. 316.

Sperryn and Co.
For the electrical engineer, the interest here lies in the display of electrical accessories, which include switches, lampholders and ceiling roses. D. 543.

Spiral Tube and Components
Featured in this display of unit heaters is the "Spiraluxe" all-electric fan heater which incorporates thermal cutout and built-in switch. The latter performs a dual function, giving not only protection against overheating but operating both fan and heater or fan only. Available in 2 kW and 3 kW sizes, the heater is suitable for floor or wall mountings. D. 710.

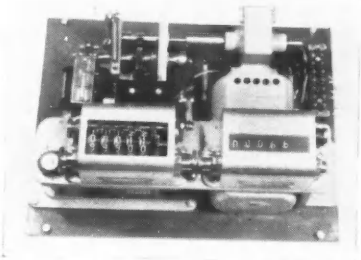
Standard Telephones and Cables
This year's display is devoted entirely to the company's activities in the design, development, and manufacture of telecommunication systems and equipment. To this end, the stand shows the part played by S.T.C. in the Coronation broadcasting and interest in this activity is likely to be centred in equipment used for relaying the television programmes from London to the Continent. C. 615/514.

Trumeter Co.
Since last year this firm's range of counters has undergone various modifications, and the latest types of equipment now embody self-lubricating bearings, black nickel-plated wheels and dust proof cases. An improved type predetermined counter has been recently developed in which the counter can be rapidly set to any number within its range up to 99999 by merely depressing the zero-setting lever and moving the number wheels. The counter then subtracts and on reaching 00000 operates contacts within the unit. By merely depressing the zero-reset the wheel will then return to the original preset number. D. 748.

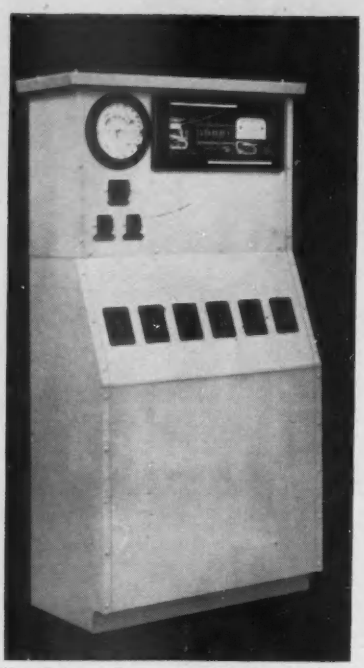


Lorival Plastics moulded this four piece collapsible plastic television cabinet for Pye Ltd.

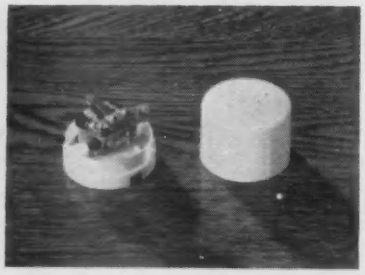
This unusual style "Solo" solder gun is housed in "Diakon" insulation fabricated for Budd and Weston by National Plastics Ltd.



Trumeter Ltd. have produced this improved type pre-determined counter up to 99999 with automatic resetting unit. Below, the now well known "Bendix" Home Laundry by Fisher & Ludlow



The Belmos Co. made this power factor correction control cubicle



On the left is shown this miniature buzzer which is a new line by Gent and Co. Ltd.

This sack elevator loader is powered by electric motor and is produced by R. A. Lister and Co.

Tubela Engineering Co.

This company's range of pipe bending machinery is being displayed, together with two new items. An hydraulic bender stand and a pipe screwing bench. D. 338.

Tufnol Ltd.

Emphasis is given to engineering applications of "Tufnol," this material being particularly suitable for service where a combination of electrical insulating and mechanical properties is required. Demonstrating this suitability is the 35 in. long by 22 in. wide terminal board produced from "Kite" brand "Tufnol." Its 14 in. long bushes and sleeves are produced from tube in the same brand. C. 613/512.

Turner Machine Tools Ltd.

This company are exhibiting for the first time at the B.I.F., showing six machines. Their RS. 5 VMD. rivet spinning machine of standard 5/16 in. capacity is of particular interest, one of its many applications being the riveting of electrical contacts. D. 753.

United Ebonite and Lorival

A plastic TV cabinet displayed on this stand marks the solution of one of last year's most difficult mass production moulding problems—the manufacture of a "collapsible" plastic cabinet. In a four piece design (for the Pye V2 table model), it was initially evolved to overcome storage problems but has since found to be advantageous in both design and production. C. 301.

J. and H. Walter Ltd.

With the lack of airing accommodation for many families living in flats, the electric clothes dryer and airer manufactured by this company provides convenient facilities for this purpose. Thermostatically controlled, the drying unit embodies a low surface temperature heating panel and two side panels of cloth to ensure maximum efficiency when closed for drying and airing. C. 705.

Westinghouse Brake and Signal Co.

Foremost in the Westinghouse display is a barrier machine designed as an alternative to the heavier type of entrance or level crossing gate. As usual, all three-phase power requirements are derived from a bank of phase converters operating from a single-phase supply. There is also a comprehensive display of rectifier units, which are augmented this year by samples from a new range of battery chargers. C. 508 and Outdoor 1341/1240.

Westool Ltd.

For the first time shown and manufactured in this country are Warner electric motion control brakes, clutches and clutch couplings which are shown under simulated working conditions for both manual and automatic control. Another new exhibit is seen in the "Westair" climatiser. C. 312.

Whitecross Co.

Exhibits on this stand cover bright, annealed, coppered, galvanised, tinned and shaped wires, conductors, and wire ropes for a number of applications. In particular, reference is made to the salvaging of the *Empress of Canada* in which 16, 3½ in. circumference ropes were used as purchase ropes to give a breaking strain of 43 tons. D. 621.

Wilkins and Mitchell

In a display devoted to "Servis" domestic electric appliances, there are for visitors this company's range of washing machines, refrigerators and rotary ironers. C. 517.

W. Wilkinson and Co.

Newly introduced for this year's B.I.F. is a pendant switch for use on large machine tools. Housed in a polished aluminium case, it employs silver contacts to minimise maintenance. Also on view are bell pushes, push button contacts and various small parts in brass, gunmetal, aluminium and stainless steel. C. 716.

Wilkinsons Tools

Here are seen the company's full range of "standard" and "special" pliers for electrical use, both single and box joint types being shown. A variety of special British post office and overseas post office tools are also displayed together with examples showing the company's willingness to produce special purpose tools for individual requirements. D. 105.

Wolf Electric Tools

Amongst newcomers to the "Wolf" range to be seen this year is their recently introduced belt sander type BS3 whilst specifically designed for the automotive industry is a new heavy duty precision valve refacer. Portable electric saws are featured in two models. C. 603/502.

Yorkshire Switchgear and Engineering Co.

For the supply engineer, there is a range of their IV 10 switchgear for both indoor and outdoor use comprising a three panel board of two fault making isolators and an o.c.b. for 11 kV service. A ring main unit and switchgear for 22 kV service are also shown, the latter incorporating in the contact system an arc trap of revolutionary design. C. 419.

POWER SUPPLY Statistics

MARCH

AFTER a comparative paucity of plant commissioned by the B.E.A. in the first two months of the year, the record for March, the end of both the quarter and the Authority's financial year, is somewhat better. In all six items of plant were commissioned—two turbo-alternator sets and four boilers. First on the list is a third 60 MW set for Uskmouth A Station, South Wales Division. This is of General Electric Co. manufacture, operating from Babcock and Wilcox 360 klb/hr boilers. The second turbo-alternator recorded is a 30 MW unit, of C. A. Parsons and Co. manufacture, for Connah's Quay Station, Merseyside and North Wales Division. It is the second set for this station, and with it is recorded the station's second 300 klb/hr boiler, which is by International Combustion.

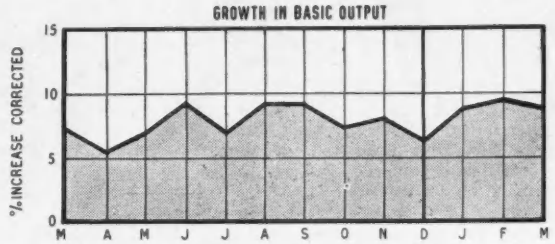
Of the remaining three boilers commissioned, two are in stations in the London Division, increasing the Division's steam raising capacity by 570 klb/hr. Firstly, Brunswick Wharf Station records another 320 klb/hr, Clarke, Chapman unit to add to six already in service with the three Metropolitan-Vickers 52·5 MW sets. The other station is Deptford East whose steam raising capacity is further augmented by another 250 klb/hr boiler. It is of Foster Wheeler manufacture, steaming at t.s.v. conditions of 950 lb/sq in., 925° F, and also powering 52·5 MW Metrovick sets. Finally, comes a 180 klb/hr boiler, the third, for Doncaster Station, Yorkshire Division. A Mitchell unit, it is to provide steam for 30 MW G.E.C. turbo-alternators, of which one so far has been commissioned.

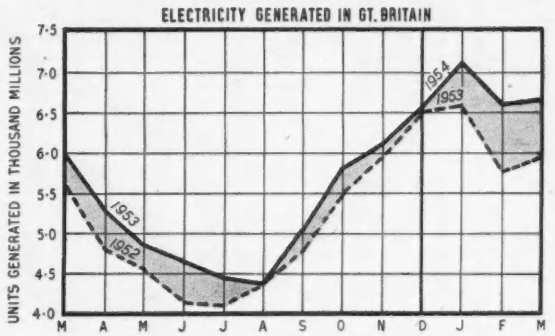
As might be expected from a month in which the effective number of working days was higher, and the average temperature lower, sales by Area Boards were well up on those for March 1953. Nationally, sales were 10·6% higher. Making allowance for working days and temperature, the corrected increase is 8·9% which, representing the basic growth in load being experienced by the Authority, compares favourably with figures obtaining throughout the year. Over the whole financial year, the load growth was 7·9%, a considerable improvement over 1952-53, in which half this value was recorded. All Area Boards have maintained a steady growth in load over the last twelve months, figures lying between 3·3% for the L.E.B. and 9·1% for the South Western Board. The North of Scotland continues to experience considerable increases in demand from its Areas, last month being 25·4% above that for March 1953.

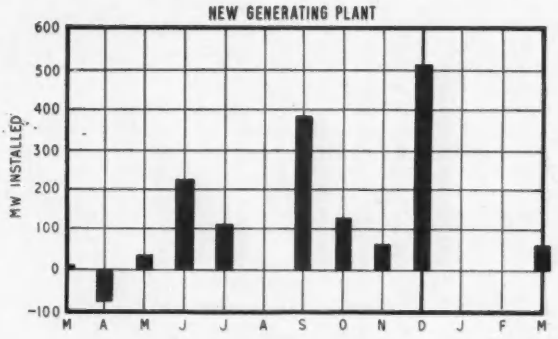
As shown by the Ministry of Fuel and Power's figures, the total installed capacity of the two Authorities stood at 19,232 MW at the end of March, an increase of 63 MW during the month.

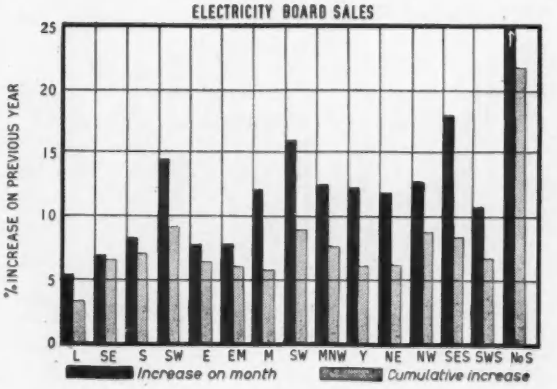
B.E.A. Sales to Area Boards in March

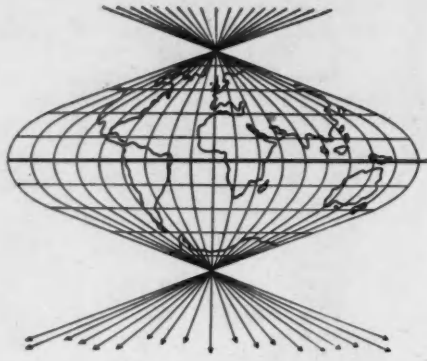
Board	Mar. Sales in million units	% inc. or dec. on Mar. 1953
London	582·6	+ 5·3
South Eastern	334·6	+ 6·8
Southern	393·7	+ 8·2
South Western	199·8	+14·4
Eastern	543·5	+ 7·7
East Midlands	461·1	+ 7·7
Midlands	636·0	+12·0
South Wales	347·9	+16·0
Merseyside and North Wales ...	345·5	+12·4
Yorkshire	611·4	+12·2
North Eastern	356·4	+11·9
North Western	679·5	+12·7
South East Scotland	134·9	+16·9
South West Scotland	314·4	+23·9
Direct Sales by B.E.A.	95·8	+10·7
Grand Total	6,037·1	+10·6











OVERSEAS NEWS

A SUMMARY OF IMPORTANT EVENTS

CANADA

B.C. Expansion

The British Columbia Power Commission is augmenting its Jingle Pot substation near Nanaimo, at a cost of $660,000. Steady growth of Vancouver Island's power requirements and anticipated future growth have necessitated the construction of a new control centre at the Nanaimo terminal of the 138 kV transmission system. The centre will house control equipment and a new 15,000 kVA synchronous condenser now on order from Canadian General Electric.

Project Development

Following the formation in January last of Balfour, Beatty & Co. (Canada) Ltd., the Canadian subsidiary of the London firm of civil and electrical engineering contractors, the Canadian company has recently taken over the assets, liabilities and personnel of the Toronto contractors —Russell Construction Co., Ltd., and will continue to operate as Russell Construction Ltd. This new organisation has an authorised capital of C$1.000.000. Sir Andrew M. MacTaggart, who is chairman of the Balfour Beatty group, visited Canada early this year for the purpose of setting up this new organisation. Mr A. B. Sharp, who has served many years with the London Company, and was its former general manager in the Middle East, is vice-president, and Mr Colin A. Campbell and Mr H. G. McHaffie, already well-known in Canada are Canadian directors of Balfour, Beatty and Co. (Canada) Ltd. Mr Colin A. Campbell will be president and Mr A. B. Sharp vice-president and managing director of Russell Constn. Ltd.

BRAZIL

Impressive Plan for Brazil

President Vargas has now presented two Bills to the Brazilian Congress, one to create a nation-wide electrification plan and the other to establish a company, entitled Electrobras, to administer it. The electrification plan is stipulated to be of ten years' duration, and has the objective of raising the existing power output of 2,500 million units annually to about 8,000 million. Under the scheme, which will involve considerable expenditure, it is proposed to construct new generating plants, inter-connect existing stations and to standardise voltages and system frequency. It is proposed that the country be divided into two areas; one termed preferential, to be supplied by an interconnected system of large power stations, while the second area would be served by small stations. To carry out the plan a domestic industry is to be established to manufacture electrical equipment and machinery. The President has said this industry must be developed to supply at least 50% of all equipment needed for the plan. The other Bill provides for setting up the Electrobras company, which will have an initial capital of 3,000 million cruzeiros to be supplied by the Federal Government. It is stipulated that only with the approval of the President, after consulting the National Water and Power Council, may Electrobras take shares in power generating and distribution companies which are not subject to control by the Union, the States, the Federal District or the Municipalities.

WEST INDIES

Finance for Trinidad

Now that the Bill authorising the Trinidad and Tobago Electricity Commission, to raise a $10½ million loan has been approved by the Legislature, it is expected that the Commission will shortly take steps to put some of its development plans into operation. We understand that the loan will not be raised immediately, but the passing of the Bill enables the government to make advances to the Commission which is anxious to place orders for plant for delivery in 1956.

NORWAY

Aura Starts Up

Ultimately to be the largest in Norway, the Aura hydro-electric station has been put into service, initially with two generators. For this the Metropolitan-Vickers Electrical Co., Ltd., have supplied the two 37,500 kVA horizontal-shaft generators driven by Pelton wheels. Five more sets are to be installed at the station. Much of the electricity generated is for use at the nearby Sunndalsöra aluminium plant, which when in full production, will have an output of about 40,000 tons annually. But the station will also supply domestic consumers.

EUROPE

Greek Project

The Greek Government has accepted in principle the tender of the American firm of Thomson, Starat and Harris, for the construction of a hydro-electric project on the Megdova River in Thessaly. The U.S. concern undertakes to provide a capital of $13 millions which Greece would repay over a period of 20 years, it is stated. The project involves the construction of a dam, a hydro-electric plant and irrigation works.

Further Schemes

A new electricity supply company has been formed in Turkey to provide power in the Aegean region. The concern, the Aegean Electricity Co., is said to be the first really large organisation formed in Turkey entirely by private enterprise: it has a capital of £T26 millions. It is proposed that the company should construct a hydro-electric station on the River Gediz.

We also hear that the Turkish Ministry of Public Works has announced that a small hydro-electric plant is to be erected at Yozgat-Karanlikdere, in central Turkey, at a cost of £T1¼ millions. As with certain other power schemes, this project has been handed to the Iller Bank.

S.W. ASIA

Work on Karnaphuli

Now that the diversion channel and coffer dams for the Karnaphuli hydro-electric and irrigation project in East Bengal has been completed, the work enters its second important stage. An American concern is designing and providing technical assistance in the work on the main dam. Apart from flood control, the scheme is planned to have an initial generating capacity of 80 MW, which would be doubled at a later date.

Plan for Rajasthan

A new project providing for increasing the power plant capacity in Rajasthan has been agreed in New Delhi between representatives of the two governments under the Indo—U.S. Technical Co-operation Programme. Under this scheme aid will be provided for restoring and augmenting nineteen power stations, both steam and

diesel, in Rajasthan, together with extensions to the transmission and distribution system. A total of about 20,000 kW will be installed under this scheme. The U.S. contribution of $3·6 millions will be spent on plant, equipment, service, etc.; while India's contribution of Rs. 17·8 millions will be utilised for defraying the costs of station buildings, power lines, etc.

West Bengal Schemes

According to the West Bengal Government's Budget proposals, the North Calcutta Electrification Grid has suffered a loss of Rs 1,61,000. But in regard to other electrification schemes it is expected that the Barrackpore electric supply scheme will show a profit of Rs 1,18,000 and the Cooch Behar Electric Supply a profit of some Rs 62,000.

MALAYA

H.-E. Survey

Preliminary work has begun in a survey for the Cameron Highlands hydro-electric scheme for the Central Electricity Board, Malaya. Surveys for that scheme were held up in 1950 as the result of bandit activity in the area. Earlier it had been estimated that a 100 MW plant could be established, and the survey work now in hand will enable a suitable water storage area to be planned. We understand that the Board are also experimenting with the use of peat in its steam power station. A considerable quantity of peat has been found in the Tanjong Karang rice growing area at a depth of about 16 ft, it seems.

FORMOSA

Scheme for Formosa

The Taiwan Power Co. in Formosa is planning to add a third generating set at Tien Leng hydro-electric plant, and it is likely that tenders will shortly be called. This is to be the first of eight such projects to be announced in the coming months, and will shortly be followed by a second at Ku Kwan, lower down the valley, for three 25,000 kW units. The Tien Leng power station is to have a capacity of 26,500 kVA.

AUSTRALIA

Power to Ration

In a Bill just discussed in the Tasmanian House of Assembly, the State Hydro-Electric Commission was to get complete control over the waters of the state for irrigation and water works, in addition to power development. The Bill also gave the Commission permanent power to ration electricity as may be necessary. In the discussion in the House various members contested the need to grant the latter power to the Commission. It was suggested that such matters should be reviewed by Parliament annually. But Mr Cosgrove, the Premier, said the Commission would be worried if it did not have the power to ration because nobody knew when there could be a breakdown. But when the Bill went to the Legislative Council earlier this month it was rejected by 12 votes to 6. As a result, power rationing in Tasmania must end on 30 June next. The Premier has said that the Government was worried about the position now that the Legislative Council had cancelled the right of the Commission to ration electricity in cases of emergency.

Atomic Power

The recommendation that Australia should begin building an atomic power station in the Snowy Mountains area immediately, has been made by Prof H. Messel, Professor of Nuclear Physics at Sydney University, N.S.W. He thought such an atomic plant would cost much less than the Snowy hydro-electric scheme and would take far less time to build; it would help to handle the average load with the hydro stations operating at peak periods.

NEW ZEALAND

Construction Trouble

Because of the troubles which developed last year with foundations, due to cracks in the rock, the Whakamaru hydro-electric power station, North Island, New Zealand, is not now expected to be in operation in the winter of 1955. The cracks found in the rock as it was uncovered has set the scheme back several months we learn. Early 1956 is now given as the most optimistic forecast date of operation of the station. The foundation problem has been solved and the necessary steps are well under way. The worst of the rock faulting is being cleaned out and made tight with concrete. A 3 in. wide crack, for instance, has been cleaned of clay and debris to a depth of 60 ft below the dam foundations and is ready for filling. In addition, 12 tunnels, each 5 ft by 7 ft, are being driven back from the dam into the rock for 100 to 150 ft. Each shaft will be filled with concrete to form a sort of "skewer" from the dam into the country, as one engineer has described the result.

Geothermal Development

Prospects for geothermal steam nearer the proposed site of the power station at Wairakei, New Zealand, are to be investigated in the next few weeks. Two more bores will probably go down to 1,500 ft. The two deep bores which were blocked last year when their internal casing crumpled under intense heat and pressure will be again opened soon. Accurate information of the measurement of these bores is required by the British consulting engineers before they can put forward a plan for the power station.

Avoiding Further Trouble

The Auckland Electric Power Board, N.Z., has agreed to spend about £43,000 on replacing 8,947 yds of vulcanised bitumen and other d.c. mains cable with p.i.l.c. d.s.t.a. cable. This urgent action is being taken to avoid a recurrence of an explosion which occurred in Shortland St last February when the National Mutual Provident building suffered considerable structural damage. The chief officer of the Metropolitan Fire Brigade has now reported that the bitumen encased d.c. underground cable and the casing was probably cracked by earth movement, thus allowing water to enter. A fault in the cable developed and heat from the resultant short-circuit set up decomposition in the bitumen, generating gas which formed an explosive mixture.

Work has now started on the second stage of the Dekhelia power station of the Electricity Authority of Cyprus, pictured alongside. This stage will comprise the installation of one 14,000 kW turbo-alternator and two 90 klb/hr boilers. The first stage, now in full operation, has two 7,000 kW and one 14,000 kW Metropolitan-Vickers turbo-alternators. Situated on the seashore the station is of the semi-outdoor type, and feeds into the 66 kV s.c.a. transmission system which has been erected by the British Insulated Callender's Construction Co. to key points throughout the Island. The station is designed for turbine stop-valve steam conditions of 400 lb/sq. in. of 750° F. Three John Thompson oil-fired boilers are installed, each rated at 90 klb/hr at 425 lb/sq. in. 770° F, with feed water at 275° F. Circulating water intake and outfall culverts run along the full length of the station between the turbine bay and the seashore. Consulting engineers for the work are Preece, Cardew & Rider, of London

Personalities

IN THE INDUSTRY

District engineer for No. 5E district of the North Western Electricity Board, **Mr K. M. Sowerbutts,** B.SC., A.M.I.E.E., has been appointed to a similar position for the Halifax district of the Yorkshire Electricity Board. Mr Sowerbutts has held his present position since 1950. Earlier, he was for three years with the South Western Electricity Board after a period as deputy mains superintendent at Bath. He was educated at Stockport Grammar School, Stockport College and Manchester University, after which he gained experience with electricity undertakings at Stockport, Ealing, Worcester and Bedford.

Mr K. R. Taylor, A.C.A., who has been secretary of Santon Ltd. since 1946, has been appointed a director of the company.

As from this month, the Transport and Electricity Department of the Wellington, New Zealand, City Council, has been split into two separate departments with a manager for each under the general managership of **Mr L. B. Hutton,** M.C., B.E., M.I.E.E., M.N.Z.I.E. The former city electrical engineer, **Mr R. S. Maunder,** M.I.E.E., M.N.Z.I.E., is manager of the Electricity Department.

Mr Seymour Booth has retired from the board of British Vacuum Cleaner and Engineering Co. Ltd.

Previously deputy education and training officer to the B.E.A., **Mr N. C. Stamford,** M.SC., M.I.E.E., has recently been appointed to the secretary's staff of the Institution of Electrical Engineers, as education officer. Mr Stamford received his general and electrical engineering education successively at Highgate School and at the City and Guilds Engineering College. After a period with Marconi's Wireless Telegraph Co. he was lecturer in electrical engineering in the University of Manchester from 1933 to 1944, in which year he became principal at Marconi College, with additional responsibility for education and training in Marconi's Wireless Telegraph Co.

The former general manager of the New Zealand State Hydro-Electric Department, **Mr F. T. M. Kissel,** B.SC.(ENG), M.I.E.E., A.M.INST.C.E., has been named by the N.Z. Institution of Engineers in its first F. W. MacLean Citation for meritorious service to engineering in New Zealand. Prior to his retirement in 1948, Mr Kissel was a frequent visitor to this country, in which he has many friends, who will join with us in wishing him continued good health.

Mr P. Rose, the Scottish representative of Ward and Goldstone Ltd., will shortly take up his new appointment with that firm as northern sales manager, based in Manchester. His place will be taken by **Mr J. McCulloch.**

New appointments to the board of Lansing Bagnall Ltd. are those of **Mr A. R. E. Arnot,** B.SC.(ENG.)HONS., A.M.I.E.E., and of **Mr R. G. Winton,** A.M.I.MECH.E., A.M.I.PROD.E., both of whom have been with the company for many years. In addition, **Mr H. P. Mott** has joined the company as materials and production controller. Mr Arnot served an apprenticeship with Ultra Electric Ltd., and a post-graduate student apprenticeship with B.T.H., Rugby. He joined Rubery Owen Messier as research engineer on aircraft hydraulics, then became special products engineer to Rotax Ltd. In 1944 he joined Lansing Bagnall, of which he is now a director and chief engineer. Mr Winton was with the London Passenger Transport Board for a number of years before becoming a lecturer in production engineering at Northampton Polytechnic and at Twickenham Technical College. He joined Lansing Bagnall Ltd. seven years ago as technical manager. Mr Mott, who is chairman of the Institute of Materials Handling, is well known for his experience in that type of work with Vauxhall Motors.

Thorn Electrical Industries Ltd. announce the appointment of **Mr Eric Hutchison** to the Atlas Lighting Division, as a special representative for the Scottish area. Mr. Hutchison was previously with the Illuminating Engineering Department of the General Electric Co. Ltd.

General sales manager of Venner Ltd., **Mr. L. C. Bingham** left this country by air last weekend for a two months' business tour of Australia, New Zealand and Malaya.

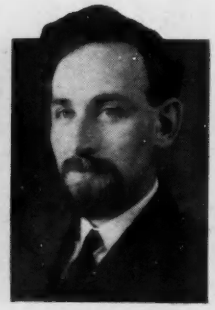
Miss Ann Smith has joined the Sales Promotion Department of the Frigidaire Division of General Motors Ltd., as demonstrator and home economist. Miss Smith read a paper on "Preservation of Food by Freezing," at the annual conference of the Association of Electrical Housecraft Advisors earlier this year.

Reaching the age of 65 on 24 May next, **Mr J. Derbyshire** is retiring from the position of district engineer for No. 2A (Wigan) District of the North Western Electricity Board which he has held since 1948. Mr Derbyshire has served in the Industry for 52 years, having served an apprenticeship with the Pemberton U.D.C. Electricity Department. Upon the amalgamation of Wigan and Pemberton, he was transferred to the Wigan Corporation Electricity Department in 1906, with which undertaking he became mains superintendent in 1928.

The appointment is announced by Johnson and Phillips Ltd. of **Mr Alan Grant** as manager of the company's Sales Department (Cable Estimating). Mr Grant joined J. and P. in 1919, and has for many years been assistant manager of that department.

Mr W. H. Taylor, chairman and managing director of W. H. Taylor (Derby) Ltd., has been elected president of the Derby Electrical Society. He is a founder-member of that society.

Mr N. C. Stamford



Mr A. R. E. Arnot

Mr R. G. Winton

Mr H. P. Mott

Mr A. Grant

At the annual meeting of the British Electrical and Allied Manufacturers' Association last Thursday, **Sir George Bailey,** C.B.E., M.I.MECH.E., M.I.E.E., M.I.P.E., chairman of Associated Electrical Industries Ltd., was elected president for the ensuing year. **Mr D. D. Walker,** M.A., M.I.E.E., and **Mr E. H. Ball,** M.I.E.E., were re-elected chairman and vice-chairman of the Council respectively. Sir George has been chairman of A.E.I. since November 1951, after being vice-chairman for nearly four years. He is also chairman of Metropolitan-Vickers, Ferguson Pailin Ltd., and the Hotpoint Electric Appliance Co., Ltd., and deputy chairman of British Thomson-Houston Co., Ltd. He started with the British Westinghouse Co. in Dec., 1907. Mr D. D. Walker, who is joint managing director of Evershed and Vignoles Ltd., joined that concern in 1930 and was later in charge of export sales. He has also been a member of the council of the British Engineers' Association for many years and was president of that association in 1951. Mr E. H. Ball has been managing director of B.T.H. since 1948, whose Export Department he joined in 1923 after experience with Bruce Peebles and Co., Ltd. and Belliss and Morcom Ltd.

Sir George Bailey

Mr D. D. Walker

Mr E. H. Ball

Due to retire in August next is **Mr W. Ashton,** manager of the transport system of Lytham St. Annes. Mr Ashton took over as manager of the system when **Mr J. C. Fairchild,** the then engineer and manager of the Electricity and Tramways Department, joined the North Western Electricity Board.

At the annual general meeting of the Batti-Wallahs' Society, **Mr C. N. Good** was elected president for 1954/5, and the six elected members of the Committee are: **Dr L. G. Brazier,** Messrs **M. D. Cloran, W. C. M. Couch,** C.B.E., **H. A. Crabtree, Alan N. East,** C.B.E., and **G. H. L. Smith. Mr T. C. F. Bigland** was re-elected hon. secretary and treasurer, and **Mr J. Temple Hazell** was re-elected assistant hon. secretary.

Secretary and commercial engineer to the North of Scotland Hydro-Electric Board, **Mr W. D. D. Fenton,** M.I.E.E., recently flew to Uganda to assist the Uganda Electricity Board in an advisory capacity in connection with the inauguration of its hydro-electric scheme which is being opened by H.M. the Queen today. He is expected to return in a week or two. Incidentally, the superintending generation engineer of the Uganda Board's Owen Falls hydro-electric station is **Mr T. Eckersley,** A.M.I.E.E., who, prior to 1948 was in charge of one of the steam power stations of the Calcutta Electric Supply Corporation Ltd., which concern he joined in 1935.

The news that a knighthood has been awarded to **Mr C. R. Westlake,** M.I.E.E., chairman of the Uganda Electricity Board, and honours bestowed upon others connected with the Owen Falls scheme which is being opened by H.M. the Queen today, will be heartily applauded throughout the Industry. For his services to the Uganda Electricity Board, **Mr Henry Olivier** gets the C.M.G. The decoration of the O.B.E. goes to **Mr J. M. Stock,** M.ENG., M.I.MECH.E., M.I.E.E., the chief electrical engineer; and to **Mr H. W. Povey,** A.S.A.A., A.C.I.S., A.I.M.T.A., while the chief accountant to the Board, **Mr E. H. Wilson,** B.COM., D.P.A., gets the M.B.E. Mr Westlake has for long been a firm believer in the ability to utilise the hydro resources of Uganda to further the development of the Protectorate—while general manager and engineer of the Finchley Corporation Electricity Department he paid several visits to the area around 1946 and 1947, to report on prospects of power development, and late in 1947 he helped the Uganda Government to formulate the Uganda Electricity Board, of which he was appointed chairman. All will agree that in bringing the Owen Falls scheme to fruition, Mr Westlake and his very able staff have done a great job—difficulties which had to be overcome were, at times, enormous.

A farewell presentation was recently made by principal officers of the Midlands Electricity Board to **Mr D. H. Kendon,** B.SC., M.I.E.E., M.I.MECH.E., formerly deputy chairman of that Board, who was appointed chairman of the Merseyside and North Western Electricity Board in February last. The presentation, of a cine camera and projector subscribed to by his former colleagues, was made by **Mr W. S. Lewis,** C.B.E., COMP.I.E.E., chairman of the Midlands Board.

Leeds Corporation Street Lighting Committee has recommended the appointment of **Mr K. J. Goddard,** assistant to the street lighting engineer at Nottingham, to the new post of technical administrative assistant in the Leeds Street Lighting Department.

Mr P. A. Thorogood, who has played such a large part in organising the Electrical Engineers' Exhibitions, has agreed to be exhibition manager for the 8th Amateur Radio Exhibition, to be staged by the Radio Society of Great Britain at the Royal Hotel, Woburn Pl, W.C.1, from 24 to 27 Nov. next. Mr Thorogood, an active amateur operating on 145 mc and 70 cm, is a past member of the R.S.G.B. Council, a member of the Council and Fellow of the Radar Association, chairman of London U.H.F. Group and president of Edgware and District Radio Society.

Mr R. McGlashen, A.M.I.E.E., has been appointed an assistant chief commercial officer at area headquarters of the South West Scotland Electricity Board. Since 1 June last he has been district commercial officer in the Central District of the Glasgow Sub-Area. Previously he was with the Merseyside and North Wales Electricity Board.

It is now officially announced that **Mr Kenneth B. Ross,** formerly manager of the Anglo-Iranian Oil Co.'s refineries at Abadan, has been appointed director of production in the Department of Atomic Energy, Industrial group, at Risley, as from 1 June. In addition, **Mr P. T. Fletcher,** B.SC.(ENG.), M.I.MECH.E., A.M.INST.C.E., M.I.E.E., Ministry of Works chief mechanical and electrical engineer, is to become deputy director (engineering services) in the Industrial Group, from the same date.

Mr C. R. Westlake

Mr J. M. Stock

Mr H. W. Povey

Mr E. H. Wilson

Mr W. E. Warrilow, M.I.E.E., and his wife are now on their way to New Zealand, aboard the R.M.S. *Rangitane*, where they will make their future home. His many friends in this country may like to note his new postal address: P.O. Box 647, Hamilton, New Zealand.

Lt-Col Sir Merrick R. Burrell, BT., C.B.E., J.P., has been re-appointed a part-time member of the South Eastern Electricity Board. **Mr G. Humphreys** has retired from the Board on completing his term of office.

Mr I. H. Hedley, B.SC., M.I.E.E., has joined the staff of Hackbridge and Hewittic Electric Co., Ltd., in the capacity of technical adviser and sales representative in Northern England and the Midlands. His services will be in addition to the company's present representation in those areas.

OBITUARY

Mr D. G. Rodger, whose death on 16 Apr, aged 68, we briefly referred to last week, had been assistant general manager (commercial) to Johnson and Phillips Ltd. since 1946. Mr Rodger was a most valued member of J. and P. for 48 years. During that time he became a well known and highly respected figure in many branches of the Electrical Industry, particularly in C.M.A. circles where for many years he was a prominent figure. Joining J. and P. in 1906, in the days of the Arc Lamp Department, of which he became manager, Mr Rodger subsequently held several senior administrative appointments with the company. For many years he was Export Sales Manager and in this capacity he was responsible for the development of the extensive J. and P. organisation overseas. In 1946 he became assistant general manager (commercial), and continued, despite failing health in recent years, to play a valuable part in the development of the company which he faithfully served for so long.

Mr D. G. Rodger

Mr A. H. M'Kay, A.M.I.E.E., mains superintendent to Aberdeen Corporation Electricity Department until his retirement in 1944, died recently. He served with the Aberdeen undertaking for 45 years.

Mr R. O. Ackerley, M.C., M.I.E.E., F.I.E.S., who, for the past four years had been operating as a lighting consultant, died on 22 Apr., aged 59. It was in October 1949 that Mr Ackerley retired from the position of manager of the General Electric Co.'s Illuminating Engineering Department, a post which he had held for eighteen years. He originally joined the G.E.C. in 1919, serving for a few years in South Africa. He was a past president of the Illuminating Engineering Society, and past chairman of the Utilisation Section of the I.E.E. He had been an active member of numerous committees concerned with lighting matters, notably the National Codes of Practice Committee, and the Illuminating Industry Committee of the B.S.I. In 1945 he was awarded the I.E.E. Crompton Premium for a paper on "Some Factors affecting the Design of Electric Lighting Installations for Building Interiors." His very many friends will deeply regret his passing. A memorial service is being held in the Queen's Chapel of the Savoy, Savoy Hill, W.C.2, today, 29 Apr., at 12 noon.

Mr F. E. Proctor, M.B.E., M.I.E.E., who died on 24 April, was deputy engineer to the London Power Co., retiring from that position at the end of 1937.

Mr E. G. Clark, C.B.E., M.C., M.SC., M.INST.C.E., who died on 23 April, aged 64, was to have retired in August from the secretaryship of the Institution of Civil Engineers—a post which he had held since 1937.

Mr F. E. Waterman, for thirty years export sales manager for Ransomes, Sims and Jeffries, Ltd., died on 20 Apr., aged 76. He retired at the end of 1947.

Mr J. H. St. Hill Mawdsley, M.I.E.E., late of Mawdsley's Ltd., died on 24 April, aged 83.

Mr F. C. Robinson, for many years in charge of industrial sales of Santon Ltd., died on 18 Apr., aged 54. He joined the company in 1939 and was for some time manager of the Birmingham branch.

NEW LITERATURE

British Diesel Engine Catalogue

Edited by D. S. D. Williams, A.M.I.MECH.E.

PUBLISHED for the British Internal Combustion Engine Association, this, the third edition of this catalogue lists the products of 38 manufacturers of diesel plant. It is specifically designed to provide precise technical information on the types of diesel made by the member firms for industrial duties, railway traction purposes, marine propulsion and marine auxiliary services.

To facilitate comparisons between the various makes, the tables of specifications are similar in layout and contents, and contain all the vital information required. A lightning index is provided in which all the makes are listed in horsepower groups, ranging from 1·5 h.p. for the smallest industrial engine up to 10,800 h.p. for heavy marine use. The volume is comprehensively illustrated both with photographs and with sectional drawings of the machines described. Published by Temple Press Ltd., Bowling Green Lane, London, E.C.1, 305 pages, 9½ in. by 13 in. Price 52s. 6d.

The J. & P. Switchgear Book

by R. T. Lythall, M.I.E.E.

AN outline of modern switchgear practice for the non-specialist user, is the explanatory sub-title of this well established favourite. Except to add that many specialists are glad to have it on hand to consult on many matters outside their narrow interest, there is little the reviewer needs to add in welcoming a fifth edition. Two new chapters make their appearance, dealing with automatic voltage regulators and with surge protection. They extend the features that characterise this book as a whole—an uncomplicated discussion of the essentials of the subject, backed up by an unusually generous use of illustrations taken from a wide range of manufacturers. There is a new appendix, as well, devoted to a discussion of voltage and current phenomea at circuit interruption.

For the rest, the mixture is as before, ranging through the whole power range of switch and fuse gear, and discussing at length such associated matters as supervisory control, protective systems, calculations, and auxiliary apparatus. Published by Johnson and Phillips Ltd., Charlton, London, S.E.7, 753 pages 8¼ in. by 6 in. Fifth edition, price 35s., with a special reduction for students; postage

BOOKS RECEIVED

Statistics for the Cost Accountant by J. A. Reece. Shows how statistics may be used in cost accounting. Published by the Institute of Costs and Works Accountants and obtained from Gee and Co. (Publishers) Ltd., 27 Basinghall St, E.C.2, 40 pages, 9½ in. by 6 in. Price 5s.

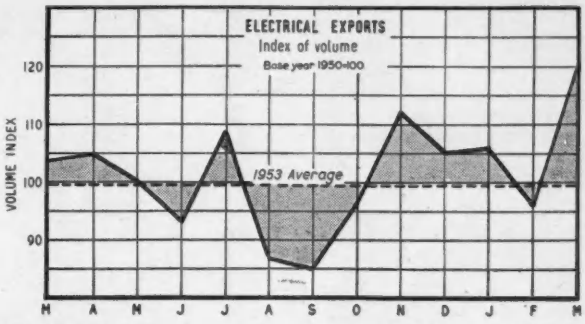
Modern Armature Contactor Winding and Repair by S. F. Philpott. Deals with practical aspects of contactors and winding of small and medium size armatures. Published by Pitman, 280 pages, 7¼ in. by 4¼ in. Price 30s.

Spheroidal Graphite (Nodular) Cast Iron, by J. Smuts. Gives indication of more important properties of a new material bridging the gap between cast iron and steel. Published by the Association of Engineering and Shipbuilding Draughtsmen, Onslow Hall, Little Green, Richmond, Surrey, 36 pages, 8¼ in. by 5¾ in. Price 3s. net.

Aluminium-Freileitungen, by Dr-Ing P. Behrens, Dipl-Ing H. Meyer and Rgkm P. Nefzger. In German, discusses, in detail, current practice in the use of aluminium conductors for o.h. lines. Seventh edition, published by Aluminium-Verlags G.m.b.h., Düsseldorf, Jägerhofstrasse 26/29, Germany, 212 pages, 9 in. by 6 in. Price, linen-bound, DM 21.60, paper, DM 19.20.

Introductory Circuit Theory, by E. A. Guillemin. Introductory treatment of basic principles of network analysis and synthesis. Published by Chapman and Hall, 550 pages, 9 in. by 5¾ in. Price 68s.

EXPORTS and IMPORTS



Statistics for March

MARCH was a good month for electrical exports, the volume being greater than at any other time during the last year. Admittedly there were more effective working days during the month but the almost phenomenal rise in the ELECTRICAL TIMES volume index, shown above, results from factors of which this is but one. At the end of the month, the volume index stood at 120·5, higher by 24·5 points than that for February and by 16·5 points that for March last year, these index figures based on 1950 as 100. Exports on which the volume index is based are those in Class D, Division 16 of the exports list, the value of exports for this group of electrical machinery, apparatus and appliances amounting to £16,944,718 during March. This figure does not include values of electric washing machines and power-operated automatic refrigerators, details of which are given in the table below.

A further indication of the trend in exports so far this year is shown in the aggregate value for the first three months relating to the goods listed in our table. For 1954 that value is £47,514,166 whereas for the same period last year the corresponding total was £46,008,646.

Of the electrical goods exported during March, South Africa took the greatest value—over £1,715,000, while India took similar goods to a total value of over £1,594,000 and Australia more than £1,320,000. The figure for New Zealand topped £1,100,000.

There were particularly noteworthy increases in exports during March for electric washing machines, diesel generating sets of over 200 kW capacity, motor starters and controllers, and for electric motors, particularly of sizes up to 250 horse-power.

Description	Exports Value (£)			Imports Value (£)	
	Monthly Average 1952	March 1953	March 1954	March 1953	March 1954
Generating Sets:					
Diesel up to 200 kW	408,225	318,832	340,571		
„ over 200 kW	214,949	84,287	590,852		
i.c. driven	31,920	36,651	27,704		
Steam turbine-driven	143,882	30,660	139,740	21,606	27,163
with other prime movers	31,520	33,412	15,811		
Generators	210,823	170,923	277,393		
„ parts	369,110	601,504	360,207		
Motors	892,465	827,650	1,038,347	61,314	25,543
Motor starters and controllers	234,035	252,076	226,208		
Convertors and rectifiers	103,602	78,302	65,604	54,122	31,329
Transformers	873,260	1,262,115	1,269,101		
Switchgear and Switchboards	1,291,656	1,489,745	1,471,208		
Batteries, primary and parts	212,536	208,853	337,204		
Fluorescent and Discharge lamps	53,194	43,057	68,388		
Other lamps	123,932	208,760	203,726		
Radio and Electronic gear	1,916,241	1,997,431	2,515,592	277,123	636,214
Telephone and Telegraph Plant	1,372,016	1,466,587	1,379,207		
Cooking Appliances and parts	114,943	112,944	174,799		
Space heaters	26,489	22,185	43,959		
Water heaters	32,963	25,430	31,567		
Other heaters and parts	128,498	141,329	164,224		
Welding machinery	86,132	116,120	131,700	29,411	38,172
Signalling and Bell equipment	53,722	55,799	74,446		
Commercial Instruments	135,473	156,715	164,202	58,667	46,743
House Service Meters	147,816	91,393	152,676		
Electro-medical and X-ray apparatus	118,910	105,613	114,943	43,052	52,385
Fans	110,447	153,182	163,933		
Vacuum Cleaners	159,303	123,420	207,467		
Other Appliances and parts	232,481	41,587	415,256		
Portable power tools	112,423	117,008	153,860		
Washing Machines up to 150 lb	443,379*	218,182	287,284		
Power Refrigerators, up to 12 cu ft	565,985	491,481	524,841		
Telephone and Telegraph Cables	746,946	926,920	590,751		
Paper-insulated Cables	883,068	883,328	788,063		
Rubber-insulated Cables	622,124	474,253	442,982	12,855	23,651
Winding and similar wires	151,677	139,500	122,635		
Other Cables and Wires	276,939	261,878	260,275		
Accumulators and parts	452,491	344,358	395,531		
Insulating Materials	165,900	89,301	132,058		
Electrical Ware	103,886	73,776	93,967		
All other articles	1,595,762	1,445,800	1,867,049	179,792	381,945
Total	16,051,060	15,775,141	17,756,843	737,942	1,263,145

* Including models of up to 250 lb in weight

Equipment for Industry

Continuous Seam Welder

CLAIMS of welding speeds of 2 ft/min are made for the new 4 kVA, electronically controlled seam welder developed by the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2. Stated to be capable of seam welding two steel sheets each about 0·01 in. thick, Inconel or nickel sheets 0·006 in. thick and brass or copper sheets 0·003 in. thick, the machine makes welds of one cycle (1/50 sec.) duration, timed by an electronic circuit using thyratron values and a multivibrator circuit synchronised with the supply frequency. Welds may be spaced two, three or four cycles apart to give 42, 31 or 25 welds/in. respectively.

The welding electrode is applied to the surfaces in the form of a continuous soft copper wire of 18 s.w.g. passing through a groove on the periphery of the lower electrode disc. One of the advantages of this method lies in the constant provision of a new electrode circuit, which avoids the re-dressing necessary with a permanent electrode wheel. Electrode wire is used direct from the reel on which it is supplied, travelling via pulleys round the bottom electrode wheel to a driven reel where it is taken up.

The G.E.C.'s new 4 kVA seam welder in operation

Both upper and lower electrode wheels are of chrome copper, the lower being driven by a f.h.p. geared motor which also drives the winding reel and the lower roller of two pairs of guide rollers. Arranged on each side of the electrode rollers, the guide rollers are designed to keep the work flat and the seam straight although the upper wheels may be lifted clear to allow curved seams to be made. Control of the unit is effected by a single, three-position rotary switch, which switches in sequence from "off" to "run" and "weld." Coarse and fine controls give infinite variation of welding current, whilst electrode pressure may be varied from 20 to 100 lb/ sq. in. Sheets of up to 14 in. wide may be accommodated.

Dexion's New Angle

MANY engineers by now will be familiar with the slotted angle produced by DEXION LTD., 189 Regent St, W.1, since 1947. As a construction medium it had a large variety of applications—from a work bench to a building frame. Last week, however, a new Dexion angle—"225"—made its appearance and this modified version of the original pattern holds out many more possibilities for this "industrial Meccano."

The new pattern of slots and holes in Dexion 225 angle gives greater versatility as shown by its use for this Dexion angle cutter stand

Dexion 225 differs from its older relation in both size and slot arrangement. Whereas the original is 3 in. by 1½ in., the new angle is 2½ in. by 1½ in. and consequently up to 15% cheaper. It will be recalled that the original angle is provided with two rows of 2⅞ in. long slots along its broader side. Each slot is separated by a distance of 3 in. between centres, slots in the row being spaced alternately with those in the other row. The other side of the angle contains but one row of slots. In the new Dexion angle, the broader side retains one row of 2⅞ in. slots on the inside but the outer row is replaced by a row of shorter ⅞ in. long slots alternating with round holes and transverse slots. In the narrowed side of the angle, the original row of 2⅞ in. slots has also been replaced by the new arrangement.

This new pattern confers several advantages on the 225 angle not obtainable with the original. Having done away with the double row of slots, the new angle is claimed to be stronger, despite its smaller size, than the original. The round holes allow a three-section corner to be constructed which has a positive bearing in all directions, the additional use of holes instead of only slots for fixing bolts minimising any tendency to slip. Moreover they enable triangulated structures to be built up. The transverse slots permit splicing of lengths of angle to extend (for example) an upright in a storage rack. The two lengths to be joined together are placed end to end and a small length of angle bolted in position through the transverse slots, to each section.

Diaphragm Pump

DESIGNED for handling many varieties of corrosive fluids and sludges, the "Linatex" motor driven diaphragm pump is a new departure for WILKINSON RUBBER LINATEX LTD., Camberley, Surrey, manufacturers of "Linatex" diaphragms. Lined throughout with this material, and employing solid "Linatex" valves and diaphragms stated to be resistant to attack from a wide range of chemicals at temperatures up to 65° C., the pumps are positive in action and, in common with this type, are self-priming. Provision is made on the crank arm to adjust the stroke and the use of rubber bearings precludes the need for lubrication. In performance, it has a stated maximum static discharge head of 25 ft, suction lift 10 ft, nominal discharge rate 8 imp. galls/min, and a maximum stroke of 1¼ in. Standard lengths of 1½ in. bore suction and discharge hose, coupling pieces and hose clips, a dip pipe for emptying drums and carboys and a set of "Allen" keys are supplied as accessories. The unit complete with its geared electric motor is mounted on a c.i. base, the pump itself having an aluminium body.

Mercury Switch Fire Detector

BEING introduced next week is a fire detector employing a mercury switch to give a positive quick action. Produced by GENT AND CO., LTD., Faraday Works, Leicester, the detector employs a conventional bi-metal strip as the temperature measuring element. When the temperature reaches danger level, the strip, instead of closing or opening a circuit, trips a mechanism which operates a mercury switch. The latter can be of the make or break type as required. This method avoids the use of contacts on the strip itself thus removing disadvantages due to slow action or dirty contact surfaces. To facilitate its installation the detector back plate is designed to fit British standard boxes. Foolproof, robust and positive in action, the detector is eminently suited for commercial and industrial premises.

E.E. Cooker price increased

AS from Monday, 3 May, the price of the model 2009D standard cooker will be increased from £37. 0s. 0d. to £39. 15s 6d. THE ENGLISH ELECTRIC CO., LTD., Queens House, Kingsway, W.C.2, say that the prices of sub circuit fuses are also increased by 1s. from 12s. 6d. to 13s. 6d.

These changes in price are attributed to rising production costs through recent wage awards. Prices of the model 2011 cooker and all other E.E. domestic appliances remain unchanged.

Atlas and Ekco warm white lamps

BOTH THORN ELECTRICAL INDUSTRIES LTD., 105 Judd St, W.C.1, and EKCO-ENSIGN ELECTRIC LTD., 45 Essex St, W.C.2, have now introduced "De Luxe warm white" fluorescent lamps.

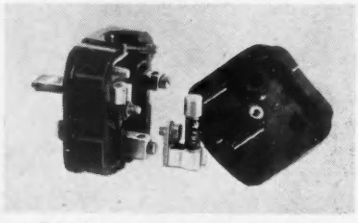
To be marketed at the same list prices as other standard fluorescent lamps they are available in all the usual lengths and ratings and have efficiencies of 33 lumens per watt and 36 lumens per watt for both the 80 W and 40 W lamps respectively.

Thorn's say that this colour was developed two years ago to meet an export demand for a counterpart of the American fluorescent lamp of this colour and was used in a number of local installations amongst which was the Cecil Sharp House, Headquarters of the English Folk Song and Dance Society in Regents Park, London.

Nettle plug improved

THE new 13 amp 3 pin fused plug RF 1231 by NETTLE ACCESSORIES LTD., Harper Rd, Wythenshawe, Manchester, has now been strengthened by the thickening of the wall sections.

Fuses are now retained on silver plated phosphor bronze clips whilst terminal pins



This plug now has strengthened walls

are removable for quick and easy wiring. Conforming to B.S. 1363 the plug is available in both brown and cream and retails at its original price of 39s. and 43s. 8d. per dozen for brown and cream respectively.

Siemens Colour Matching Unit

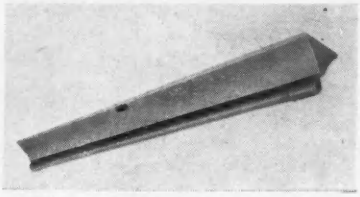
GIVING a light of special quality almost identical to that of natural daylight at a colour temperature of 6.500—7.000° k, the new unit FTF 2444 introduced by SIEMENS ELECTRIC LAMPS AND SUPPLIES LTD., 38-39 Upper Thames St, London, E.C.4, is of great value in the paint, printing and textile industries.

The light source is a combination of two tungsten lamps and two 2 ft 40 W blue fluorescents. These are housed inside a robust sheet steel casing in stove enamel cream finish outside and white inside with acrylic plastic diffusing screen providing a 24 in. x 17½ in. window and giving a large area source of low brightness. The two light sources are separately switched in a neat three-way switch block. Consuming approximately 220 W, the unit gives light intensity of 45 lumens per sq ft on a working plane 3 ft below the unit or 20 lumens/sq ft 5 ft below the unit.

Metway's 2 pt Kettle

LAUNCHED at the second Electrical Engineers Exhibition by METWAY ELECTRICAL INDUSTRIES LTD., King St, Brighton, Sussex, the D.A. 349 meets a demand for an inexpensive (34s. 9d.) 2 pint electric kettle.

In polished aluminium with three insulated feet the kettle has a 750 W immersion element (non-automatic). It is supplied for standard voltage ranges 200/220 V and 230/250 V and is complete with detachable earthed connector and three core flex.



This Seagull has been added to the Ediswan range

Ediswan Seagull Fitting

A NEW fluorescent lighting fitting, using the familiar Seagull reflector, is now available from THE EDISON SWAN ELECTRIC CO., LTD., 155 Charing Cross Rd, W.C.2.

This fitting consists of a reflector and channel of special design housing the latest type Ediswan control gear. There are two versions, for one or two 5 ft 80 W fluorescent lamps. It is made of heavy gauge sheet steel, "Bonderised," and finished in high gloss, white, stoved enamel, whilst fixed white plastic b.c. lampholders are fitted. These are spring loaded, with retractable end shields to facilitate re-lamping, and incorporate an earthing clip.

Two keyhole slots, with "Pendicone" washers are provided for easy ceiling fixing on 42 in. centres. For suspension by chain or by ¾ in. conduit two holes are provided on 42 in. centres.

The channel and reflector are linked internally by two chains so that the channel can be installed with the reflector suspended from it and all wiring connected.

The control gear is securely mounted to the channel. Polychloroprene insulated wiring is colour coded, securely cleated to the channel, and protected from metal chafing by rubber grommets. The new "brick" type choke (or choke transformer for instant start lamps) is virtually silent in operation and has a liberal thermal capacity. With switch start gear the starter switch is accessible from the outside.

For the Electrical Trade

The "Mastergrill"

THE "Mastergrill" infra red contact griller to which we made reference in our 1 April issue is provided in the a.c. version with a thermostat, this being a particular feature of the griller.

The d.c. version is provided with three heat control.

Two New "Oryx" Soldering Tools

TWO models have been added to the range of Oryx pencil type soldering instruments which are distributed by ANGLO-NETHERLANDS TECHNICAL EXCHANGE LTD., 3 Tower Hill, E.C.3.

The first is Model 11 which has been specially developed for soldering at a higher temperature than usually required. This model can be supplied for operation on 6 V and gives a bit-temperature of 400°C within 45 seconds from switching on. The bit size is 4 mm and consumption 10 W.

The second is a version of Model 12 (12 W) which can be operated from 50 V supplies in addition to the normal 6, 12 or 24. Prices of these models are Model 11—£1. 15s. and Model 12 £1. 5s.

Trade Publications

CONTROL GEAR.—Brook special control panels are listed in list 757 published by BROOK MOTORS LTD., Huddersfield.

ACCESSORIES—A fourth edition of Fitzgibbon and Murray's lighting and bell accessories catalogue is available from the Lower Mill, Ewell, Surrey.

SWITCHGEAR.—Details of the stringent tests to which C and F switchgear is submitted, are to be found in booklet S118 published by COOKE AND FERGUSON LTD., Manchester 11.

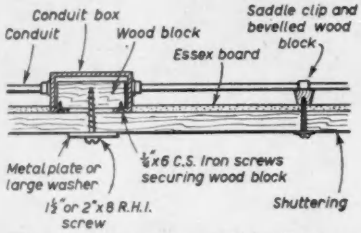
TROLLEYBUS WIRING—Overhead conductor equipment for tramway and trolleybus route wiring is listed in a new book by BRITISH INSULATED CALLENDERS CABLES LTD., 21 Bloomsbury St, W.C.1.

PROBLEMS AND PRACTICE

In Engineering

Fixing Conduit

FURTHER to the article under this heading in the 18 Mar. issue, I suggest that a piece of hardwood block should be fitted in each conduit box and secured into position by means of ¼ in., No. 6 c.s. screws, inserted through the tapped holes in lugs of box, as shown in the accompanying diagram. Place the box at the position of point and scribe around the circumference of box in pencil or steel scriber. At the centre of circle so formed, drill a ¼ in. hole for a fixing screw right through shuttering board. If now the Essex board inside the circle is removed by means of a tank cutter, a recess will have been formed to allow conduit box to seat flush on to shuttering



This diagram suggests a method of fixing conduit to shuttering when "Essex" Board has already been placed in position

board. When shuttering is removed the box will then be found to be flush with the ceiling. The recess will prevent box moving during the process of final fixing by means of fixing screw and metal washer or plate. This plate can usually be obtained in situ from scrap materials and need only be ⅛ or ¼ in. thick with ¼ in. hole punched or drilled to take screw. It should be about 2 in. square so that it can easily be seen when time arrives for removal of shuttering. It is advisable to use a deeper conduit box for work installed in concrete so as to enable at least ¼ in. of concrete to penetrate under conduit runs. The back-outlet type of box with one, two or three outlets is essential where steel re-inforcing rods are employed.—*W. H. Williams.*

High Resistance Earths

WITH respect to earth testing, whilst the local earth may prove on test to be of a low value, earth return circuits sometimes encounter high resistances outside the local earth area as the following will show. It was our practice, when installing motors connected to the three-phase overhead supply, to earth the motors by steel pipes driven about 6 ft into the ground.

On completion, a test wire was connected to one phase of the l.t. supply, and via a knife switch and 15 amp fuse

Every engineer has a story to tell; why not tell yours on this page? We welcome contributions to this feature, and those published will be paid for at our standard rates. Problems which are encountered and overcome in day-to-day maintenance or installation of electrical plant; useful methods and techniques developed for specific jobs, or current practices, all make instructive reading for others. We will also consider for publication problems requiring an answer. Sketches are often helpful and need only be rough, as they will be redrawn before use.

to the earth pipe. In every case of several hundreds only once could a fuse not be blown. A test was made of the local earth by means of the Evershed's earthometer and quite low readings were obtained with auxiliary earth spikes. No neutral or cable being available close by, a fairly long earth lead had to be run to a cable sheath some distance away. The sub-station neutral earth about two miles away was not suspect as other areas were not affected.

The Water Department would not permit earth connections to their piping, although we tried hard to convince them that a.c. would not damage their piping. Their prejudice perhaps was not ill-founded, however, when we saw from time to time what had happened in the way of sheath attack to cables run in the vicinity of the old tramcar routes! The soil in this area was largely made up of sand and tin slag from a local tin smelting company and most probably large areas in the open had dried out with the above results.—*K. Coombs.*

Conduit Burrs

SOME TIME ago I had a very interesting fault, in fact, a fault to give anyone a headache. I was informed that a 40 h.p. motor star-delta starter, controlling a pump, would only go for ten minutes and then trip the main switch. I tested the switch and motor, and found everything satisfactory. I started the motor and it ran for some ten minutes, then a flash seemed to come from the motor, whilst the main switch tripped again. In checking with the "Megger" tester again, I got an infinity to earth test. I examined the coils of the motor, not even a smell of burning; thought I would give it another try and the same thing happened. The flash seemed, as before, to come from the motor.

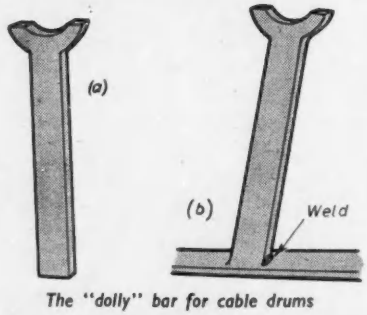
I decided to pull the motor out, and on disconnecting its terminal box I noticed just where the conduit entered from the switch, a small colouring of soot. Instead of proceeding with the motor further, I took the pipe and leads from switch and motor and found the cable burnt just at the end of the pipe, but just inside, quite hidden from view when the terminal box was examined. The flash must have travelled along the cable opening where the leads from the coils are placed to the terminal box, thus giving a false impression that it came from the motor.

The cause of the trouble was that the burrs or sharp edges were not removed when the conduit had been cut and screwed. Probably the test of the finished job was satisfactory but the sharp edges must have cut about half-way into the insulation and after a time caused the breakdown.

I found later the person who put this job in and was told it was done on a Saturday morning when they were in a hurry to go to a football match. They had omitted to file the inside of the conduit, and as they got a good test took everything for granted. May I add the rider that every man installing electrical machinery for high voltages should take time to ensure a good job. Otherwise, not only does an employer stand to lose but a fault may mean someone being electrocuted. Time is never grudged if a job is done properly.—*G. A. L.*

Drum "Dolly" Bar

MAKESHIFT methods are frequently adopted for turning cable drums on their axes, and the use of old pieces of tube, drum battens and so on can be a source of danger to the operatives. The following simple "dolly" is designed to obviate danger and facilitate turning and can be made by any blacksmith or light engineering works. The bar shown at (a) consists of a piece of iron or steel bar of, say, 2 in. by 1 in. section and 2 ft to 2 ft 6 in. overall length, with a cup-shaped recess at the top—rather like a



The "dolly" bar for cable drums

large open-ended spanner. As the drum is turned the bar is held so that a flange fixing bolt-head drops into it, thus arresting side movement of the drum.

The above bar would be satisfactory on a hard surface but where soft ground is encountered the type of bar as in (b) is more useful. In this type a plate is welded on the foot of the bar to spread the load over a greater area.—*L. A. Budd.*

BRITISH STANDARDS

Adhesive insulating tape for electrical purposes. *B.S. 1078: 1954. Price 2s. net.* In general, this revised edition gives more details concerning methods of test for compliance with requirements than in the now superseded war emergency standard, but differs from that document in that two forms of ageing test are described, whilst clauses relating to slitting, properties after storage, sampling and marking are new additions. As in the previous publication, requirements for describing the tape, its dimensions, breaking strength, permissible number of pinholes and electric strength are included, but the insulation resistance test has been omitted.

Methods of testing raw rubber and unvulcanised compounded rubber. Part 2: Methods of Chemical analysis. *B.S. 1673: Part 2: 1954. Price 7s. 6d. net.* During the revision of the 1940 edition of B.S. 902 it became evident that the revised standard would be better served by a number of separate publications, of which this is the latest document. In this part, details of some score of methods of determination of materials present in rubber. Not all the possible analytical procedures are given, as many of these are similar to those used for vulcanized rubber and hence may be found in B.S. 903:1950.

Limits of radio interference. *B.S. 800: 1954. Price 4s. net.* The major change in this revised edition is seen in the extension of the frequency range to cover television transmission. The standard now specifies the limits of magnitude of radio noise voltages across the terminals of electric appliances and of radio noise fields in two ranges, 200 to 1,605 kc/s and 40 to 70 Mc/s, different limits being specified in the two bands. As in the 1951 edition, the standard applies to equipment connected to distribution systems of declared voltage between conductors not greater than 500 V and between any conductor and earth not greater than 250 V.

Characteristics and performance of apparatus for measurement of radio interference. *B.S. 727: 1954. Price 4s. net.* In this revision, the equipment described is now suitable for the measurement of radio noise at frequencies ranging from 150 kc/s to 150 Mc/s, a more detailed specification replacing the somewhat loose requirements laid down in the 1937 edition. The apparatus specified is intended for measuring both field strength and terminal voltages, whilst band-width, time constants and indicating instrument characteristics are such that readings indicate the annoyance effect of the interference.

Gear hobs. *B.S. 2062:1953. Price 5s. net.* Recognising that sizes of hobs for general purposes should be restricted in number and their limits of accuracy closely defined, this standard, in its first part, covers the diametral pitch range of 1 to 50 for such hobs used in the production of gears complying with the basic rack tooth profile given in Fig. 5 of B.S.436. Three accuracy grades, A precision ground, B ground, and C unground hobs, are specified, their permissible errors agreeing closely with those of the American Gear Manufacturers' Association. In the second part, limits of accuracy, but not tooth form design, are specified for hobs used in producing turbine and similar drive gears complying with B.S.1807.

Determination of power factor and permittivity of insulating materials. *B.S. 2067:1953. Price 4s. net.* The method described in this new standard for p.f. and permittivity determination is that developed by Hartshorn and Ward, being suitable for measurements at frequencies ranging from 10 kc/s to 100 Mc/s. Adopted as a standard test for insulating materials, it is a resonance method, employing capacitance variation in a tuned circuit with valve voltmeter detection of resonance. Details of the technique to be followed in testing moulded and sheet material and tubes and liquids are given, together with drawings illustrating the basic test circuit and some of the equipment used.

Glossary of terms for characteristics of radio receivers. *B.S. 2065: 1954. Price 6s. net.* Definitions and descriptions of the electrical characteristics of radio receivers are given in a form permitting a standardised measurement and description of a receiver's performance. However, this new standard does not specify methods by which the defined quantities may be measured. Although a definition may imply a method of measurement, any method may be employed proved that the defined quantity may be derived from the observations. To ensure their application to most types of receivers, definitions are expressed in a generalised form, and hence do not cover all characteristics of certain special types of receiver.

Electrical cable soldering sockets. *B.S. 91: 1954. Price 3s. net.* It was found necessary to revise B.S. 91 when it was discovered that the industry was using two distinct series of tubular lug sockets. Whereas, one series, specified in the 1930 edition, is designed for cables of specified size, irrespective of the type used, the second series, in accordance with a war emergency amendment, is designed for specified currents, the socket being required to carry the largest cable necessary to carry the current. This revision thus makes allowance for these two separate needs, at the same time bringing into line requirements for hot pressed or cast lug sockets, and it relates to the two classes of lug and clamp sockets. Its scope ranges from 7/·044 to 120/·103 in conductor size and 15 to 500 amps in current capacity.

Extra-low voltage and low-voltage, spring return, non-latch switches for aircraft. *B.S. G.145, January, 1954. Price 2s. net.* Applying to both hand and mechanically operated switches, spring loaded to return, for use on aircraft systems of up to 112 V d.c. or 208 V a.c. at 400 c/s, this standard specifies general and particular requirements for construction, operation and reliability under service conditions. Neither switches mechanically nor electrically latched in the operated condition, nor push-button switches, operated and released by depressing the button are dealt with.

Code for disappearing-filament optical pyrometers. *B.S. 2082: 1954. Price 6s. net.* Most portable disappearing-filament optical pyrometers show an accuracy of about ±1% and whilst this is sufficient for most purposes, a higher degree of precision is necessary in certain industries to ensure accurate process control. A portable instrument capable of an accuracy of ±½% in temperature is therefore of considerable value, and accordingly this standard code has been prepared to indicate to both user and manufacturer the possibilities of improved design. The main text is divided into five parts, general, principles of optical pyrometry design requirements, calibration procedure, and selection and training of operators. No rigid specifications are laid down for design, the aim being merely to indicate the features necessary to satisfy requirements of theory.

Railway signalling symbols. Part 2: Wiring symbols and written circuits. *B.S. 376: Part 2: 1954. Price 12s. 6d. net.* The publication of this revision of part two (the revised part one was published in 1951) now brings B.S. 376 up to date, providing an invaluable standard for all concerned in railway signalling. This document not only gives signalling symbols for both wiring diagrams and written circuits, but explains a system of labelling wires to ensure that each conductor may be identified with that shown on the wiring diagram. Notes and recommendations on nomenclature and wire labelling are also included together with examples of common combinations.

Sizes of sensitized material for recording instruments. *B.S. 1193: 1954. Price 2s. 6d. net.* Not only is this standard a revision of the 1945 edition, but it now supersedes B.S. 865:1939, the perforation pitch of 70 mm. film previously dealt with in the latter standard having now been brought into line with that for other film sizes. Another new feature is seen in the inclusion of 80 mm. film used in mass radiography, and this size is suggested as the preferred width for future recording apparatus covering film widths between 70 and 120 mm.

Copies of the above Standards are obtainable from the B.S.I. at British Standards House, 2 Park St, W.1, at the prices stated.

NEWS OF THE WEEK

Census of Domestic Demand

N.W. Board to carry out First Survey of Domestic Appliances

A CENSUS of domestic appliances is being carried out by the N. Western Electricity Board. All consumers in the Board's area (over 1,250,000) are to be asked to co-operate and indicate which appliances are in use in their households. On the next quarterly accounts sent out a special section will list seven appliances, and consumers will be asked to indicate the appliances they possess. The seven appliances listed are cookers, refrigerators, kettles, immersion heaters, storage and sink heaters, wash boilers and washing machines. A notable omission is the electric fire. The information will be detached by accountants and the required statistics compiled. As accounts are rendered street by street and district by district, local figures will be easily obtained. Requests for this information are expected to be made on two quarters' bills, and although a 100% response is not anticipated, results should be more than sufficient to gain accurate assessments.

Object of this enquiry is to discover the extent to which domestic appliances are used, and to assist in the planning of the Board's distribution system so as to ensure the maximum efficiency, economy and continuity of supplies. An explanation to this effect is appended to the bill, as well as an emphatic assurance that the information supplied will in no way affect the charges which consumers are already paying. It is notable that the method of obtaining this information will involve very little extra cost. Only the cost of extra printing on the bills will be incurred. Whether or not the statistics obtained will be used for any other purpose, e.g. sales of appliances, is not known, nor would a Board official commit himself on the subject.

The Board has been trying to obtain a comprehensive record of consumers' demand since vesting day. Reasonably complete records for some areas were taken over on nationalisation but by no means all districts kept such figures, and the Board's statistics were therefore far from complete. A survey on similar lines, although far more extensive, was carried out by the E.R.A. in 1945, but so far as is known no other census of this kind has been carried out either nationally, in the North-West, or in any other Area of the B.E.A.

Difficulties Encountered at N. Hessary Tor

ESTABLISHMENT of a television service for Devon and Cornwall may be delayed still further, the B.B.C. warns. Agreement as to the location of the television station at North Hessary Tor has been reached following the public enquiry at Exeter last September, but it is alleged that there are commoners' rights affecting the site, of which the present owners of the land have no records. The consequent legal processes may take several months, it is stated.

Radio Engineers' Industrial Electronics Convention

THE third post-war Convention of the British Institution of Radio Engineers, which is to take place at Oxford University from 8 to 12 July will be concerned entirely with industrial electronics. Possibly the main event in the programme is the Clerk Maxwell Memorial Lecture which will be given at the Clarendon Laboratory by Sir John Cockcroft on the opening evening.

In addition, however, the Convention will comprise over 30 other papers to be presented during the five-day meeting. The programme has been divided into six sessions, each consisting of papers and discussion. The first will be on "Industrial Applications of Electronic Computors." Sessions 2 and 3 on the Friday will deal with "Industrial Applications of X-rays and Ultrasonics" and "Neucleonic Instrumentation and Application." The two sessions on the Saturday will deal with "Electronic Sensing Devices (Transducers)" and "Process Control." The final session will deal with "Electronic Aids to Production."

Full details of the papers, chairmen, fees, etc., may be obtained from the Institution. Other items on the agenda will be the Institution Banquet and demonstrations of appropriate instruments and apparatus.

SOCIETY OF ENGINEERS CELEBRATES CENTENARY

FOUR days of celebrations in London, from 4 to 7 May, will mark the centenary of the Society of Engineers (Incorporated). The festivities will end with a Centenary Banquet. After 100 years of continued progress, the Society now has members in all parts of the world, a separate Division in Australia, and strong representation in such rapidly developing areas as India and Pakistan, Africa and Canada. Development in each of the Society's main branches of engineering will be represented in four papers at the main business sessions of the celebrations on 5 May. Sir Robert A. Watson-Watt, the meteorologist, will depict the electrical progress. These business sessions will be at Burlington House, Piccadilly, W.1.

On 4 May there is to be a conversazione at the Science Museum in S. Kensington, and 6 May will be Ladies' Day. Scottish members are to hold their festivities on 15 May. It is announced also that H.R.H. the Duke of Gloucester has consented to become Patron.

B.E.A. Order for 132 kV Aluminium-sheathed Cable

A CONTRACT for the supply and installation of both lead-sheathed and aluminium-sheathed 132 kV oil-filled cables in the 275 kV substation at Elstree (Herts) has been awarded to British Insulated Callenders' Cables Ltd by the B.E.A. These will be the first 132 kV aluminium-sheathed oil-filled cables installed in this country and B.I.C.C. are proud of their claim that in 1951 they supplied the first 33 kV aluminium-sheathed impregnated pressure cables. The installation will include three straight joints which, although of standard electrical design, will involve the application of plumbing techniques developed from jointing lower voltage aluminium-sheathed cables. It will also involve laying cables direct in the ground and terminating them in outdoor type sealing ends. Incidentally, the work will afford an opportunity of comparing the characteristics of aluminium- and lead-sheathed oil-filled cable of the same voltage and under identical working conditions.

Junior Institution's New Home

NEW premises have been acquired by the Junior Institution of Engineers. The Institution has bought the historic premises of Pepys House in Rochester Row, Westminster, which will be the Institution's headquarters in place of the old offices at 39 Victoria St, S.W.1, which they have occupied since 1901. The Institution was in fact established back in 1884 as an association of apprentices in the Lambeth engineering works of Maudsley, Sons and Field Ltd. At present its membership comprises representatives of nearly every branch of engineering and extends throughout the world. Current president is Sir John Hacking.

A New Market can be exploited in El Salvador

IF ANY U.K. manufacturer is looking for a comparatively small market where there is an opportunity of becoming one of the first suppliers of a product in the field, he might do worse than look again at the Central American Republic of El Salvador. The scope is admittedly small but that might well be an advantage. The reason for drawing attention to this prospective market is the potential demand for electrical equipment and appliances brought about by the advent of a more plentiful and cheaper power from the River Lempa electrification scheme this year. The Overseas Economic Survey for El Salvador, just issued, states there will probably be an increased demand for domestic electrical appliances of all kinds, from ranges, deep freezers and refrigerators, to irons, saucepans and hot plates, as well as radios and radiograms.

Until the River Lempa scheme becomes effective which, as reported last week on page 586, is expected to be in June or July, even the domestic demand for electricity cannot be satisfied. Thus much of the general development of the country depends on that project. Initial output will be 30,000 kW but it will be possible to increase this by 50% by the addition of a third turbo-generator unit. It is stated that the Electric Light Co. (a subsidiary of a Canadian firm) will be investing up to Colons 12 million in new plant up to the end of 1956. It is officially anticipated that the cost of power will be substantially lower than before.

The standing of British commodities is good and the quantity imported into El Salvador has steadily increased, although it must be remembered that the close proximity of the U.S. presents the usual difficulty. British machinery is very popular but the question of servicing and spares constitutes an obstacle tending to divert trade from Britain to the U.S. Another point of note is that the sale of some articles tends to suffer from the lack of adequate showroom facilities. A final item of information is that the establishment of a television transmitting station, and costing some Colons 1·5 million, is contemplated.

February Sales of Radio and TV Sets

THERE was little change in the average number of radio and television sets sold in February, following the considerable fall in sales during January. The latest figures issued by the R.T.R.A. show that radio sales picked up slightly while TV sets sold fell a little. Purchases of radio sets remained above the corresponding figures for 1953 while those of TV sets were below. The average number of sets sold per shop was:

Month	1954	1953
Radio:		
January	8·76	6·8
February ...	8·92	5·64
Television:		
January... ...	7·96	10·03
February ...	6·55	8·1

Agreed Payment of £8,500 in Patent Case

PAYMENT, by consent, of £8,500 damages in a patent action brought by the English Electric Co., Ltd., against the Brush Electrical Engineering Co., Ltd. and W. G. Bagnall, Ltd., Worcester, has been approved by Mr Justice Lloyd-Jacob in the Chancery Division. Mr Eric Walker, for English Electric, said the parties had agreed to the sum being paid as damages for infringement of two letters patent, and also by way of costs. The damages related to locomotives mentioned in a schedule attached to the consent order, which also restrained the defendants from infringing the patents.

Contracts Awarded for Belfast Power Station

AN announcement of the award of contracts worth a total of £4,415,000 in respect of the Victoria Power Station was made by the Ministry of Commerce on behalf of the N. Ireland Joint Electricity Committee. The contracts have been placed as follows: C. A. Parsons Ltd. will supply two turbo-alternators (about £1,477,000); four of seven boilers will be made by Mitchell Engineering Ltd. (about £1,507,000), and the remainder by Babcock and Wilcox Ltd. (about £1,316,000); and Stewart and Partners Ltd. will carry out the main excavation work and piling.

The placing of these contracts has brought to an end a controversy which has raged for over a year and involved Parliamentary legislation. Main part of the dispute involved the seven boilers and whether or not tenders should be publicly invited. It will be noticed that this part of the contract has been split up between the two firms concerned in the original dispute, which followed the award of the whole contract to Babcock and Wilcox Ltd. The value of this part of the work is £2,823,000, or a saving on the first contract of £153,496, considerably less than the saving anticipated by the dissentients.

OFFICIAL PUBLICATIONS

RADIO RESEARCH, 1953. H.M.S.O. 1s. 9d. (See page 620.)

MINES. Report for 1952 of H.M. Inspector of Mines. E. Midland Div. H.M.S.O. 2s.

BRITISH STANDARD. B.S. 2467, 1954: Minimum Safety Requirements for Lighting Fittings for use with Hot-Cathode Tubular Fluorescent Lamps.

OVERSEAS ECONOMIC SURVEY. El Salvador (see this page). H.M.S.O. 1s. 6d.

INDUSTRIAL DISPUTES TRIBUNAL AWARD. Wage Rates in Electrical Contracting Industry. H.M.S.O. 4d.

Revised Requirements in improving Old Houses

A CIRCULAR letter has been sent to local authorities by the Minister of Housing explaining the steps to encourage the modernisation of houses with the aid of Government grants. One of the main purposes of the letter is to emphasise a number of points which appear to have been misunderstood, particularly as regards the revised requirements a dwelling must satisfy after improvement, to attract a grant. The Minister has power to waive some of the requirements in individual cases. Among these requirements are the proper illumination and ventilation of rooms; the provision in each room of adequate points for gas or electric lighting; and adequate heating.

Telling the Teachers

IT is generally agreed that the electrical industry is not getting its fair share of the best boys leaving public and grammar schools. A valuable way of correcting this is to let the masters see how young entrants are trained in the industry, and this was the object of the Easter School for headmasters and senior science masters which was held at the Trafford Park works of Metropolitan-Vickers Electrical Co. last week. Some 18 headmasters and 88 science masters attended together with representatives of the Ministry of Education and the I.E.E. and I.Mech.E. It was the fifth organised by the company since 1928, and the three useful days comprised talks, and visits to manufacturing and research departments.

Industrial Safety Conference at Scarborough

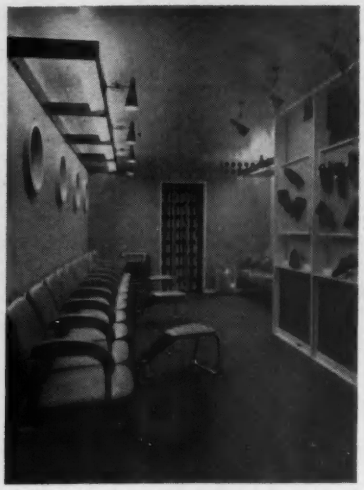
THIS year's National Industrial Safety Conference is to take place at Scarborough from 14 to 16 May. The business sessions will be held at the Spa Theatre and the coincidental exhibition of industrial safety equipment will be at the Vernon Rd skating rink—a much more suitable home for the display than has been usual in the past. The conference programme includes six papers, one of which is particularly relevant to electricity. On the Saturday Mr S. J. Emerson, H.M. Electrical Inspector of Factories, will read his paper on "The Safe Use of Electricity." A feature, not previously included in the conference, will be Question Time in the final session. Delegates will submit written questions to the speakers before the session, and the latter will thus have had time to give considered replies. This innovation will in no way replace the questions and discussions which take place after each paper. The Conference is, of course, organised by the Royal Society for the Prevention of Accidents.

New Lighting creates Attractive Shoe Shop

RECENTLY opened shoe shop of John Kavanagh Ltd. in Kingston-on-Thames presents another example of the power of a lighting installation in enhancing what might otherwise have been an unpretentious shop. The premises in question was previously a hardware store and had considerable depth but only a very narrow frontage.

General lighting in the ladies' department on the ground floor is provided by 4 ft 40 W daylight fluorescent tubes on a canopy, giving indirect lighting from the ceiling and diffused direct illumination through opal glass. "Forrest Modern" fittings on the canopy edge and over display panels are used as spotlights. The gents' and children's department in the basement has been treated in the same way except that reeded "Perspex" diffusers have been used. The staircase between the two departments is illuminated by 3 ft 30 W fluorescent lamps hidden in cross beams, a treatment which tends to reduce the steepness of the stairs. Each of the two window displays is lit by daylight fluorescent tubes mounted on the ceiling and hidden by detachable anodised aluminium baffles instead of the more common egg-crate louvres. Spotlights are also included to accentuate particular areas.

The installation was planned by Thorn Electrical Industries Ltd. (who also supplied the fittings) and the architect, Mr F. Atkins, and carried out by the S.E. Electricity Board.



Men's and children's department, illuminated by Thorn Electrical Industries Ltd. in the new Kingston shoe shop of John Kavanagh Ltd

NEW CABLE SHOWROOM

THE new London centre of Wandleside Cable Works Ltd. has now been formally opened. Located in 30 Tottenham St, just off Tottenham Court Rd, this centre, consisting of a stores, with which is associated a showroom, is under the direction of Mr I. Harris. Full technical advice can be given by the staff, and stocks are available to cover a wide range of requirements. The centre is of course principally designed to aid wholesalers, factors and contractors.

The First Half-Century

An examination of the list of exports of electrical machinery from the United States to foreign countries for January shows that Great Britain purchased more than any other country, namely about £19,000 or about one-fifth of the whole. Next to Great Britain comes Japan, to which country £14.000 worth of electrical plant was exported. Spain took only £17 worth, which shows that the Germans and Swiss have not let the Americans have much share in the very considerable amount of business that has been done there. These figures, though remarkable, are, it must be remembered, for one month only.—*From our issue of 28 Apr. 1904.*

Churches in Doncaster protest to Y.E.B.

DONCASTER'S Free Churches are organising a joint protest against considerably increased charges imposed on them by the Yorkshire Electricity Board. Before nationalisation, church officials state, they had an arrangement with the local undertaking which has now been cancelled. They were now being charged at the same rates as commercial concerns with the result that they were paying four or five times as much. The Board have pointed out that their new standard commercial tariff fell into various groups, one of which included churches, and consideration was given to the churches' load. It was not for the Board to subsidise one class of consumer, and although sympathetic to the churches' difficulties, they had to charge a fair and true cost of afforded supply to each class of consumer.

New Factory at Exeter

A NEW electrical factory has been built on the Marsh Barton estate, Exeter, for Globelite Industries Ltd., a subsidiary of Southern Areas Electric Corporation Ltd. The move into the new and impressive premises has now been completed and the task of hastening the repair of marine auxiliaries to an even quicker turnover begun. This was the main purpose in mind when the factory was planned as a rapid service in this work is essential. A subsidiary of the Southern Areas Group, Globelite are associated with the Dursley (Glos) firm of Mawdsley's Ltd., makers of marine auxiliaries, motors, generators and alternators; with Ross Courtney and Co., Ltd., of Holloway (London), who make wire-end terminals, mechanical and electrical components; and with railway signalling engineers, Tyer and Co., Ltd.

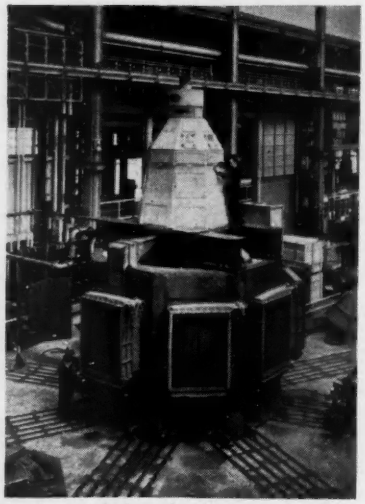
S.E. Board asked to extend H.P. Facilities

SOME concern over the more attractive hire-purchase terms being offered by the gas industry has led the S.E. Electricity Consultative Council to ask the Board to extend facilities for hire purchase in respect of electric cookers. At the Council's meeting at Hove last week details were given of the differences in quarterly payments asked for similarly priced cookers. Because gas cookers could be bought over a period of five years payments were appreciably lower than for electric cookers which had to be bought within three years. A district committee's report asked that urgent attention be given to extending the period of payment by at least 12 months, and this was approved by the Council.

It was also pointed out to members that a large number of cookery demonstrations were being held in the area, but these appeared a waste of time and money in view of the unattractive hire-purchase terms offered. Better terms were offered by firms than by the Board.

E.P.E.A. DINNER

AS in previous years, the Palmerston Restaurant, Bishopsgate was the scene last Friday of the annual dinner of the Southern Meter Engineers Technical Group of the E.P.E.A. Mr W. G. Slater, in the chair, proposing the toast to the guests, paid tribute to speakers who had presented papers during the year. Mr W. T. O'Dea replied in the same popular style as at each of the six dinners since the war. In accordance with custom, Mr R. Thompstone, immediate past chairman, proposed "The Chairman," and Mr Slater replied.



On the test bed at the Witton works of the General Electric Co., Ltd. is this vertical shaft water-wheel alternator destined for the N. of Scotland Hydro-Electric Board's Errochty power station. The alternator has an output of 25 MW at 11 kV and is the second of three to be made by the same company for Errochty. The first set will be ready for commissioning in a few weeks

MORE TARIFF TROUBLE OVER THE KITCHEN

NOT A LITTLE trouble has been encountered in the assessment of electricity tariffs by the kitchen. Should a kitchen be classified as a room? When does a scullery become a kitchen? The problem has not yet been solved, and consequently we note a recent test case heard by the Resident Magistrate at Londonderry. Council house tenants there refused to pay a 3s. 6d. charge added to their bills in respect of the kitchen and one man was summonsed by the Corporation for refusing or neglecting to admit an official to the house. It was stated in defence of the 600 tenants involved that the total room charge was assessed originally at 14s., but this was raised to 17s. 6d., to include the kitchen; a step which should only be taken by mutual agreement. Moreover the tenants asserted that the room was a scullery. The tenants refused to allow officials to enter and cut off supplies.

The Corporation pleaded that a mistake had been made and the kitchen overlooked originally. The room was described in the plans as a kitchen, it was used as a kitchen, and they held that it was in fact a kitchen. The City Electrical Engineer said a scullery was a small recess off the kitchen and without cooking arrangements, neither of which qualification applied. The magistrate found that the room was properly chargeable and fined the defendant 1s. Bail was fixed pending an appeal.

French Contractors on Three-day Visit

A DELEGATION of French contractors visited this country earlier this month, primarily, we understand, to inspect the "Ductube" pneumatic tubing system of internal electrical servicing. The party represented the Federation Nationale de l'Equipment Electrique and spent three days in London and Plymouth. They inspected the system at a multi-storey block of flats at Southwark, several sites where flats are being built in Plymouth, and then returned to London for a final inspection of police flats at Islington.

SPRING MEETING AND GOLF

NEWS from the I.E.E. in Scotland is that the Centre is to hold its Spring Meeting at the Atholl Palace Hotel at Pitlochry from 21 to 24 May. The full programme of entertainment appears most attractive, and the "headquarters" appealingly situated. The meeting is to include an inspection of progress at Errochty power station, tea at Clunie power station and an inspection of the fish ladder at Pitlochry station. Arrangements have now been completed for the annual golf competitions. The finals for the Hutcheson-Winning Cup and Bogey contests will be played off on 22 May.

Mr V. W. Dale, director and secretary of E.D.A., congratulating the winners of the Association's Public Speaking Competition, Mrs Joyce Hallworth and Mr Sidney Malin

South-West's Public Speaker Successful Again

FOR THE second successive year the Faraday Shield in the men's section of E.D.A.'s Public Speaking Competition has been won by a representative of the S. Western Electricity Board. The successful contestant in 1954 was Mr Sidney Malin, third assistant engineer in the Board's Bristol district, who chose as his subject "Life without Electricity." Thus the premier award in the male section of this annual, and increasingly popular, contest, will remain at the S.W. Board's headquarters for another year; the men of S. West England following the example of the Yorkshire women who kept their trophy in both 1950 and 1951.

The finals of the public speaking competition took place at the Lighting Service Bureau in London last Friday. There were 9 women finalists and 10 men competing for the Faraday Shields, one of which is awarded to the winner in each section and held by the appropriate Board; the individual concerned winning a small replica. The competition is open to all employees in the electricity supply industry, who have first to succeed in area contests.

This year's winner of the women's section was Mrs Joyce Hallworth, a demonstrator in the New Mills district of the N. Western Electricity Board. She spoke on "Bringing Electricity to Rural Areas." It will be recalled that the N. Western Board carried off both trophies in 1952. Runner-up to Mrs. Hallworth was Miss Thelma Parkinson, a demonstrator in the Sheffield district of the Yorkshire Board, who spoke on "The Housewife in the Reigns of the Two Elizabeths." Runner-up in the men's section was Mr Philip Tatchell of Little Barford generating station in the Eastern Division, who spoke on "The Place of Electricity in the National Economy."

Sayings OF THE WEEK

"The only fair method of charging for current was on the basis of the amount used, not on valuation or the number of rooms in houses" . . . PROF W. B. STANFORD, speaking in the Irish Senate.

"The type of man wanted was the 'engineering scientist,' the man not only capable of long-term work but who was anxious to see it transferred into practical engineering work" . . . DR WILLIS JACKSON, speaking at Trafford Park last Thursday.

"The American operative reckons a company on the up and up is a better bet for his money than a bum outfit with no dough" . . . MR D. D. WALKER, chairman of B.E.A.M.A. Council, speaking at the annual meeting.

NEWS IN BRIEF

Midlands Radio Industry Golfing Society's competition for the McMichael Cup has been won by Mr J. H. Jones, of Shrewsbury. Runner-up was Mr E. Hill, of Old Hill.

Aerialite Ltd., and their subsidiary, Nettle Accessories Ltd., are celebrating the opening of the new depot in Blythswood St, Glasgow, with a luncheon at the Grand Hotel next Tuesday.

Coventry's city architect may be appointed as consultant for the electrical installations of all municipal dwellings in schemes undertaken by private architects. We understand the housing committee is recommending this action to obtain uniformity in the standard of installations in council dwellings.

A five-day residential study course on "Wage Administration and Negotiation" opens at the University of Birmingham on 2 May. It is being organised by the Institute of Personnel Management.

N. of Scotland Hydro-Electric Board staged a special one-day exhibition of electrical appliances at Aboyne on Wednesday.

Premises at 7-9 Arthur St, Ayr, have been bought by the B.E.A. for use as showrooms.

Edinburgh is to go ahead with plans to establish smokeless zones. Plans have been hampered hitherto by shortages of smokeless fuel.

COMPANY ACTIVITIES

IT was unfortunate that Mr J. J. Hambidge, the chairman of British Vacuum Cleaner and Engineering, announced a loss of £62,000 for 1952/53 against a profit for the previous year of £130,000, without any explanation to shareholders. Despite the maintenance of the dividend of 25% the shares fell 1s. 9d. to 12s. Fortunately the full report was published a couple of days later, with the necessary explanations. Abnormal and exceptionally adverse trading conditions in the early part of the company's year were responsible for the setback. Mr Hambidge also reported that there was a substantial improvement during the latter part of the year which has since been maintained. This is his justification for the maintenance of the dividend.

This "Goblin" company has sold some freeholds which bring in a nice £217,803 profit while another £46,453 comes back into the accounts being unrequired for tax. The profit on the freehold sales, less tax on balancing charge £17,141, is transferred to capital reserve. After all adjustments a credit balance of £74,346 goes forward compared with £115,839 brought in. Bank overdrafts have been reduced from £524,000 to £343,000, so that the picture in the end is less gloomy than might at first have been anticipated.

An unexpectedly good year has been enjoyed by Ever-Ready (Gt. Britain) whose profits before tax went up from £847,621 to £1,076,992 and the dividend from 35% to 40%. There is also to be a 50% scrip bonus. The 7% cumulative participating preference stock is to be converted into 10% cumulative non-participating preference stock. In a year when German competition became strong the group did wisely in its specialised field of light electrical equipment to pass on to customers the benefit of raw material price reductions and the purchase tax concessions.

Mr H. W. Bosworth, the chairman of Lancashire Dynamo Holdings, is nothing if not honest. Though his profits for the first time have crossed the £500,000 mark (at £505,454 against £488,302) in a difficult year, he refuses to prophecy about the current year. But he says that during the last 12 months "conditions have completely changed. Not only has there been a falling off of demand but competition has become intense." Perhaps Mr Bosworth is a trifle over nervous about his ability to rise above such obstacles which he apparently did not find difficult to do last year.

Such is the need for capital in the radio rentals industry, that Mr P. Perring-Thoms, the chairman and joint managing director of Radio Rentals Ltd. is prepared to pay fairly highly to eliminate the redemption rights of the company's £150,000 5½% redeemable cumulative preference shares of £1 each. The main redemption term is 21s. per share on 31 Dec., 1961. There is an optional clause for stock to be redeemed at 22s. 6d. up to 31 Dec., 1961. Instead of which, it is proposed to cancel the redemption rights and as compensation to offer preference shareholders 18,750 5½% cumulative preference shares of £1 each in the proportion of one for every eight held. Ordinary shareholders are also to get a 50% share bonus.—*From our City Correspondent.*

British Vacuum Cleaner and Engineering Co.

Some surprise has been caused by the revelation in the preliminary statement that operations during the year ended 30 Sept. last resulted in a net loss of £32,331 after crediting £29,834 tax reserve no longer required. In the previous year there was a net profit of £47,525, after allowing £82,559 for taxation. The dividend, however, remains at 25%. The directors report that trading conditions in the early part of the year were exceptionally adverse. These conditions substantially improved during the latter part of the year and the improvement has since been maintained.

Year to Sept. 30	£ Trading Profit	£ Net Profit*	% on Ord. Earned	% on Ord. Paid	Ord. Price High	Ord. Price Low
1949	115,056	35,850	38	20	13/6	7/-
1950	189,564	60,181	71	25	13/3	7/1
1951	284,964	87,480	105	25	19/6	8/9
1952	216,838	47,525	52	25	14/9	12/6
1953	62,552†	—	—	25	16/6	11/-

*Available for parent company.
†Net loss.

Crofts Engineers (Holdings) Ltd.

In connection with the one-for-one free scrip issue earlier announced, the directors now propose to raise the nominal capital from £900,000 to £1,500,000. This is in excess of present requirements to meet any future contingencies but there is no intention of issue just yet the balance of 800,000 Ordinary shares.

Currys Ltd.

The dividend is again 17½%, but on the enlarged capital. Group profit for the year ended 30 Jan. last is £657,722 which is £35,716 higher than for the previous year.

Elliott Brothers (London) Ltd.

On the increased Ordinary capital, a dividend of 20% is recommended, compared with 15% before on the smaller capital. For the year ended 31 Dec. last. the profit, before taxation, is £142,802, which is £34,076 higher than that for the previous period. The sum of £50,000 (*£30,000*) is placed to general reserve, and £34,000 is transferred to tax equalisation account, representing relief in respect of initial allowances carried forward.

Ever Ready Co. (Gt. Britain) Ltd.

The consolidated net profit, after taxation, for the year ended 28 Feb. last is £406,807, compared with £348,263 for the previous year. There is a final dividend of 25% making a total of 40% for the year—5% more. It is proposed to capitalise £505,201 from reserves in issuing to Ordinary stockholders one Ordinary 5s. share for every two held. Consent of the Treasury has been received.

Ever Ready Trust

With a final dividend of 9% the total distribution for the year ended 31 Mar. last is 15%—1% higher than a year ago. The balance of revenue for the period is £58,139 (*£55,657*).

Glenfield and Kennedy Ltd

The final dividend for 1953 is increased to 12%, making a total of 17% (*15%*). The consolidated net profit is £426,768 (*£291,866*).

Harland Engineering Co. Ltd.

The group net profit for 1953, after all charges, is £69,487, compared with *£70,511* for the previous year. The dividend is raised by 1% to 11%.

Hopkinsons Ltd.

A final dividend of 12½% is recommended on the Ordinary capital which was increased by a 100% scrip issue. This makes a total of 22½% for the year (equivalent to 40% on the old capital) as against 32½% a year ago. After allowing for increased taxation, the net profit for the year ended 31 Jan. last is £392,632, compared with £350,137 for the previous year.

Lacrinoid Products

The preliminary statement of this plastics moulding concern shows a profit for 1953, after all charges, including taxation, of £6,161 as against £2,556 a year ago. The dividend is doubled at 10%.

Lancashire Dynamo Holdings Ltd.

The full report for the year ended 31 Dec. last shows that the turnover of the group, at about £6,800,000 was approximately the same as in the previous year, although difficulties were encountered in some spheres. The Willesden works, for instance, encountered increasing difficulty in obtaining orders for small machines towards the end of the year, largely because of keen continental competition. But Foster Transformers, Crypton Equipment, Nevelin Electric and Lancashire Dynamo Electronic Products Ltd., all had a very successful year. Mr H. W. Bosworth, the chairman, anticipates that heavy expenditure will be required in the

Year to 31 Dec.	£ Trading Profit	£ Net Profit	% on Ord. Earned	% on Ord. Paid	Ord. Price High	Ord. Price Low
1949	396,501	150,040	54	22½	5½	91/-
1950	492,229	176,859	56	22½	99/-	90/-
1951	578,589	203,157	33	12½*	56/3	42/1
1952	599,556	200,531	31	12½	44/6	37/6
1953	631,301	229,907	33	14	47/-	41/-

* Plus 100% capital bonus.

current year on the plant replacement programme. It is also proposed to increase productive capacity in certain fields, involving further extension of the electronic company's factory at Rugeley.

Laurence Scott and Electromotors Ltd.

A dividend of 17½% plus a 2½% bonus is to be paid for 1953—which is 5% higher than for 1952. After taxation, the net profit is £188,286 as against *£185,313* a year earlier.

Mavor and Coulson Ltd.

With a final dividend of 10% the total distribution for 1953 is again 20% but on the enlarged capital. Net consolidated profit before taxation is £429,662 compared with £408,710 for the previous year. It is proposed to apply to the Capital Issues Committee for consent to transfer £350,000 from reserve to capital account and to issue Ordinary shares in the ratio of one-for-one.

McMichael Radio Ltd.

For the year ended 31 Dec. last the trading profit is £111,318, compared with £81,396 for the previous twelve months. The dividend is increased by 4⅛% to 12⅜% for the year.

Parnall (Yate) Ltd.

For 1953 the group net profit amounts to £91,946, whereas there was a loss of £189 for the previous twelve months. The dividend is raised by 2% to 8%.

Rawlplug Co. Ltd.

With a final dividend of 40%, plus a bonus of 5%, the total distribution for 1953 is 60% (*55%*). It is also proposed to make a 100% free scrip issue by capitalising £100,000 from reserves. Net profit of the parent company, after charging profits tax and E.P.L., is £258,600 (*£234,137*).

Telegraph Construction and Maintenance Co. Ltd.

Apart from achieving an 8% higher turnover, there was considerable activity in the planning of new business in the future that augurs well. In all, £305,009 was spent during the year on buildings, plant and machinery, the Rt Hon Lord Colgrain the chairman, states. Capital commitments outstanding now amount to the considerable sum of £765,222. A great deal of that expenditure is for the re-equipment and re-deployment of plant to ensure the maintenance and modernisation of productive capacity.

Year to 31 Dec.	£ Trading Profit	£ Net Profit	% on Ord. Earned	% on Ord. Paid	Ord. High	Price Low
1949	357,132	144,698	27	9*	43/3	35/6
1950	393,938	142,443	26	11	43/6	35/3
1951	525,076	166,306	32	10	47/1	38/–
1952	702,205	229,693	22	9½†	29/1	22/1
1953	599,463	257,123	24	8½	31/3	25/6

*Plus 25% capital bonus. †Plus 33⅓% capital bonus.

Veritys Ltd.

There is a bonus of 2½% in addition to the usual dividend of 10%. Trading profit for 1953 amounts to £69,988 as against *£65,375* a year ago.

ELECTRIC SUPPLY NEWS

Bromsgrove

THE Rural Council is objecting to the proposal of the Midlands Electricity Board to take an overhead line across Gannow Green Common, Romsley—part of the Clent ridge of hills. The Council has urged that every effort should be made to find an alternative route to avoid breaking the skyline, and members are to meet representatives of the Board. The clerk to the Council, Mr W. Dudley, has also pointed out that the freeholder of the common was not known; if the council entered into any agreement with the Board the local authority should be indemnified against any possible claim for damage which might be made by the freeholder. It was agreed that the Board should be asked to advertise the route of its intended overhead line.

Eire

THE Electricity Supply Board has placed a contract with Malachy Burke (Contractors) Ltd. for the civil engineering work for the hydro-electric scheme on the Clady River, Co. Donegal. This contract, valued at around £350,000, is the first such project in the history of the State to be undertaken by an Irish firm, it is claimed. Focal point of the scheme will be at Gweedore Hotel, some 3½ miles from Bunbeg. The main dam will raise by 12 ft the levels of the three lakes higher up—Lough Dunlewy and Upper and Lower Lough Nacung. This will divert the full power of the river's flow through a 1¼ mile-long head race canal to the power station at Dower, two miles south of Bunbeg, near the mouth of the Crolly River. Here, through a 1,600 ft long steel penstock, the water will fall 194 ft to drive a 4,000 kW turbine. In addition to the dam, head race and power station, the scheme will necessitate the erection of a fish pass and a new bridge at Gweedore, as well as some miles of roadway. Some 13½ million units will be generated annually under the scheme, it is estimated.

Felling-on-Tyne

The Urban Council is in touch with the North-Eastern Electricity Board regarding the diversion of two 66 kV electricity feeders crossing the Leam Lane housing estate. The Council has been informed that the present route of the cables made the development of the estate very awkward. The Board said that if the Council could not adjust its housing layout to leave the cables in their present position, the Board would divert the lines subject to the cost being borne by the developing authority. The cost of placing the lines underground would be between £55,000 and £60,000, but an overhead diversion scheme would cost £18,000. The Council has approved the proposed overhead diversion in principle subject to the approval of the Ministry.

Heywood

AT the recent meeting of Heywood town council, strong objection was made to the proposed siting, close to a beauty spot at Ashworth, of a transformer station in a 15-acre site, inside the Rochdale borough boundary line. The Surveyor's Committee had suggested an alternative site on the north-eastern side of Edenfield Rd. Discussions had taken place between representatives of the County Council, Rochdale Corporation and the B.E.A. True, the proposed site was not in Heywood, but in Rochdale and it was therefore the chief concern of Rochdale's town planning committee. But the Heywood Surveyor's Committee had been asked for their observations, and it seems evident that they are perturbed at the prospect of the transforming station with its attendant pylons and transmission lines in a local beauty spot.

North of Scotland

THE first of the main contracts for the Loch Shin hydro-electric scheme have been placed by the North of Scotland Hydro-Electric Board. George Wimpey and Co., Ltd. are to build the Shin generating station and tunnel and Lairg dam. R. J. McLeod (Contractors) Ltd. are to construct the Cassley generating station, aquelucts and a 2½ mile tunnel. The scheme will produce about 154 million units annually.

LIGHTING SCHEMES

Andover. The T.C. has approved in principle a scheme to spend £6,000 a year for 25 years on electric street lighting.

Rutherglen. The T.C. is to improve street lighting in new housing schemes at Blairbeth and Spittal.

Bembridge. M.O.T. approval has been received to conversion of street lighting from gas to electricity at a cost of £2,000.

Burnley. The T.C. has been asked to prepare schemes for conversion of lights in four streets to sodium-vapour lamps.

Harrogate. The T.C. has been recommended to convert street lighting to automatic control, at a cost of £8,000.

Lanark. The C.C. has approved a street lighting scheme, costing £96,650 covering fifteen towns and villages. Under this 1,691 electric lamps will replace 983 existing gas lamps and electric lamps.

Lunesdale. The R.D.C. has approved a scheme for tungsten street lighting in 18 villages in the area, at an estimated cost of £2,669.

COMMERCIAL INFORMATION

Contracts Open at Home . . .

Dates given are the final for receipt of tenders unless otherwise stated.

30 Apr.—Fifeshire. Installation in 40 houses at Kinglassie and 18 at Carnock. —See 15 Apr. issue.

30 Apr.—Sheffield T.C. Installation in 1,025 dwellings on Greenhill-Bradway estate.—See 15 Apr. issue.

30 Apr.—Wakefield. Lighting installation in Carlton St Primitive Methodist Church and School.—See 15 Apr. issue.

1 May—Bury T.C. Sodium street lighting scheme.—Advertised in 15 Apr. issue.

3 May—Berwickshire. Electrical work in extension and reconstruction of Coldstream junior secondary school. Applications to County Clerk, County Buildings, Duns, by above date.

3 May—Lancashire. Five private telephone exchanges at ambulance stations. —Advertised in 22 Apr. issue.

3 May—Manchester T.C. 20 cwt goods lift for New Central Stores.—Advertised in 15 Apr. issue.

3 May—West Riding. Rewiring at Barnoldswick C.E. school.—See 15 Apr. issue.

3 May—West Riding. Rewiring at Liversedge Littletown county school.—See 15 Apr. issue.

3 May—West Riding. Rewiring at Mexborough Roman Terrace and Tadcaster schools.—See 1 Apr. issue.

3 May—Wrexham T.C. Installation in 205 houses on five sites.—See 22 Apr. issue.

5 May—Anglesey. Lighting fittings for primary school at Holyhead. — See 22 Apr. issue.

5 May—Bedlingtonshire U.D.C. Concrete columns, steel transmission columns and lighting lanterns.—See 22 Apr. issue.

5 May—Middlesbrough T.C. Lamps and dry cells and street lighting columns during year from 1 July.—See 22 Apr. issue.

5 May—Withernsea U.D.C. Electrical work in erection of eight bungalows at Highfield. D. B. Wright, clerk of council, Municipal Buildings, Queen St. Deposit £1. 1s.

7 May—Belfast T.C. Primary current injection testing set.—Advertised in 15 Apr. issue.

7 May—Belfast T.C. CO_2 fire fighting equipment.—Advertised in 1 Apr. issue.

7 May—Edinburgh T.C. Supply of standby generating set for civil defence building, South Side. City Architect's Office, City Chambers.

8 May—Leicester T.C. Street lighting equipment.—Advertised in 22 Apr. issue.

10 May—Birmingham. Three air compressor sets for Tame and Rea District Drainage Board.—See 15 Apr. issue.

14 May—Belfast T.C. Installation at Power Station West (Tender No. N.1519) of portable fire fighting appliances. Merz and McLellan, consulting engineers, Carliol Hse, Newcastle-on-Tyne. Deposit £5. 5s.—Advertised in this issue.

15 May—Blackpool T.C. Equipment for street lighting.—Advertised in 22 Apr. issue.

15 May—Musselburgh T.C. Supply and erection of (a) 31 columns and mercury discharge lamps at Fisharrow; (b) 10 columns and sodium lamps at Eskside West; and (c) 10 columns and sodium lamps along Heddington Rd. Burgh Surveyor, Municipal Offices, High St.

15 May—Salford T.C. Lamps and cables during year from 1 July.—See 22 Apr. issue.

15 May—Walsall T.C. Electrical equipment in home for aged persons in Princes Ave. R. E. Goakes, chief welfare officer, 29 Leicester St, Walsall.

17 May—Glasgow T.C. Traction batteries for cleansing dept.—See 15 Apr. issue.

17 May—Port Talbot T.C. Electrical installation works in about 96 houses at Goytre. Borough Engineer and Surveyor, Municipal Buildings.—Advertised in this issue.

17 May—Stepney B.C. Installations in flats in Sidney St. scheme.—Advertised in 1 Apr. issue.

17 May—West Riding. Rewiring of Aldwick-le-Street Highfields school. — See 15 Apr. issue.

18 May—Co. Antrim. Electrical installation at Ballymoney new primary school. Documents from Office of Educ. Committee, 475 Antrim Rd, Belfast. Deposit £3. 3s.

21 May—Edinburgh T.C. Electrical installation in Clermiston North housing development, contract 5. Applications to City Architect, City Chambers.

24 May—Stourbridge T.C. Electrically and diesel driven vertical spindle centrifugal pumps at Enville St pumping station.—See 8 Apr. issue.

26 May—Durham. Installation in 144 houses at Acre Rigg.—See 15 Apr. issue.

28 May—Belfast T.C. Lighting and heating installation at Power Station West (Tender No. N.1506). Merz and McLellan, consulting engineers, Carliol Hse, Newcastle-on-Tyne. Deposit £5. 5s.—Advertised in this issue.

No date stated—Isle of Man. Complete l.t. installation in proposed herring reduction factory at Peel, including wiring of motors, heating and lighting systems. W. Preston, engineer to Herring Industry Board, 13 Beeches Ave, Carshalton, Surrey. Deposit £1. 1s.

No date stated—Welshpool (Mon.). Installation of electrical equipment at Guilsfield Institute. Mrs. E. C. Gwynne, Dolrhuddyn, Guilsfield, Welshpool.

No date stated—Midlothian. Electrical installation in block of six shops and three dwellings over at (a) Danderhall, and (b) Poltonhall. County Architect, 32 Palmerston Pl, Edinburgh.

. . . and Overseas

*Details of items marked * may be obtained on application to the Board of Trade, Lacon House, Theobalds Rd, W.C.1, quoting reference.*

15 May—Iraq. Central Foreign Purchasing Board invites tenders on behalf of Min. of Health for supply of electric lift. B.o.T. (Ref.: ESB 10077/54)*.

17 May—Canada. Tenders (No. H.E.S 54-9 and 10) invited for supply of two 3-phase step down transformers, 4,000 kVA, O.N.S., 60 c/s, 12,000-2,400 V. Also for 27 single-phase automatic induction type feeder voltage regulators for installation in substations in Winnipeg's 4·16 kV feeder systems. City of Winnipeg, Hydro-Electric System. B.o.T. (Ref.: ESB 5153/54)*.

18 May—Egypt. Supply of various circuit-breakers, instrument transformers, secondary relays, etc., for Cairo Electricity and Gas Administration, 53 Fouad El Awal St, Cairo. B.o.T. (Ref.: ESB 9754/54).*

20 May—India. Tenders (No. 115/54) invited for supply of 22 kV, 6·6 kV, and 660 V cables and accessories. Bombay Electric Supply and Transport Undertaking, Electric Supply Branch, Electric Hse, Bombay. B.o.T. (Ref.: ESB 9524/54).*

20 May—South Africa. Supply of radio equipment for Harbour Signal Radio Station at Port Elizabeth, for Stores Dept., S. African Railways. Tender No. C.7655. B.o.T. (Ref.: ESB 10163/54).*

Your Queries Answered

Readers are invited to make use of our free enquiry department which possesses wide resources including an index of trade information with over 100,000 entries

A Selection from the 113 queries answered this week

Resistors marked Bedlington Station and AWL 3192, makers of? A.E.L.—Welwyn Electrical Laboratories Ltd., Bedlington Station, Northumberland.

"Airway" vacuum cleaners, address for service? L.A.B.—Airway Service Engineer, 247 Neasden Lane, N.W.10.

"Mixmaster" food mixers, agents for? H.I.T.—S. Guiterman and Co., Ltd., 37 Soho Sq, W.1.

"Dandy" shavers, address for? A.W.L.—Dandy Swiss Shaver Ltd., 73 Endell St, W.C.2.

"Nulux" irons, makers of? E.E.B.—T. Price and Son (Stampers) Ltd., Forward Works, Spring Hill Passage, Birmingham 18.

"Systym" irons, address for service? T.E.—Tym's Electric, System Works, Kennard Rd, E.15.

Sewing machine motor marked UNIVERSAL, makers of? D.E.—Sew-Tric Ltd., Honeypot Lane, Stanmore, Middx.

Centrifugal switches, makers of? V.L.—Igranic Electric Co., Ltd., Bedford; Plessey Co., Ltd., Ilford; Cumbrian Light Eng. and Instrument Co., Ltd., 24 King St, Maryport, Cumberland.

20 May—South Africa. Stores Dept. S. African Railways invite tenders for supply of various quantities of electric cables to various specifications. There are two contracts involved, namely tenders No. C.7430 and C.7665. B.o.T. (Refs.: ESB 10162/54 and ESB 10161/54 resp.)*

21 May—India. Supply of 1,000 miles twin twisted T.R.S. telephone cables 1/·029. Tender No. SE-3/4438-D/IV. Directorate General Supplies and Disposals, Shahjahan Rd, New Delhi. B.o.T. (Ref.: ESB 10029/54).*

31 May—Iraq. Supply and erection of one complete 50 kW generating set at Qalat Sukar for Directorate General of Municipalities, Baghdad. Documents at ID/250 per copy. B.o.T. (Ref.: ESB 10075/54)*.

4 June—N. Rhodesia. Choma Town Management Board invites tenders (REB/3E) for supply, installation, etc., of o.h. line distribution at 6,600 and 400 V for township. Documents from consulting engineers, Brian Colquhoun and Partners (Rhodesia), at Rhodelect Hse, Baker Ave, Salisbury, S. Rhodesia, or R.S.T. Buildings, Hospital Buildings, Lusaka, N. Rhodesia. Deposit £3. 3s.

9 June—Australia. Supply of single-phase distribution transformers (Specif. No. 443) for Townsville Regional Electricity Board, of Electricity Commission of Queensland. Copies of specification available at office of Agent-General for Queensland in London.

14 June—Kuwait. Supply of 11 kV wood pole o.h. line equipment for distribution system. Documents from President of Dept. of Electricity, Govt. of Kuwait, Kuwait.—Advertised in this issue.

Contracts Placed

Croydon. Rewiring at Mayday Hospital, William Steward and Co. Ltd., £4,479.

London. Manufacture, supply, etc. of passenger lift and two meals service lifts at high school in Wandsworth, Bennie Lifts Ltd., £3,327; renewal of electrical installation at Central London Women's Inst., Alexander Hawkins and Sons Ltd., £3,083; wiring and lighting fittings at Barnaby Buildings, Bermondsey, and Durham Buildings, Battersea, Haines and Sheppard Ltd., £2,636.

Newport (Mon.) T.C. Electrical installation at Maindee police station, F. H. Wheeler (Sheffield) Ltd. of Cardiff.

Seaham (Dur.) U.D.C. Electrical installation in 120 houses and 30 bungalows, J. Calvert.

TRADE MARKS

This information is extracted from the Official Journal by permission of the Controller.

Canda. in design 727,383. Class 9. Malleable iron-conduit fittings. Cornfield and Aldridge, 19 Spout La, Walsall, Staffs.

Electric Muscles. 727,428. Class 9. Solenoids and parts. Westool Ltd., St. Helen's, Auckland, Bishop Auckland, Co. Durham.

Ray-o-Vac, Leak Proof, 718,526, and 718,528. Class 9. Dry cells, dry cell batteries and cases for pocket lamps and torches. 718,527 and 718,529. Class 11. Torches, Ray-o-Vac Co., 212 East Washington Ave, Madison, Wisconsin, U.S.A.

PRICES of cable metals and other materials

Figures quoted are the official prices ruling on Tuesday, 27 April

	£ per ton	Weekly change £	Price last year £
COPPER, standard class A (settlement)	248½	+3½	253
„ (3 months)	237	+3	—
LEAD, refined pig, min. 99·97% purity (cash)	94½	+1	81½
„ (3 months)	92½	+½	79½
TIN, refined, min. 99·75% purity (settlement)	750	−2	737½
„ (3 months)	745	+2½	727½
ALUMINIUM, ingots 99·99·5%	156	—	161
ZINC, virgin, min. 98% purity (cash)	79½	−½	65½
„ (3 months)	79½	—	69½
RUBBER No. 1, RSS. spot (per lb)	19¾d.	+1½d.	21d.
„ c.i.f. basis, ports, July (per lb)	19¾d.	+1½d.	21d.
ARMOURING:			
Galv. Steel Wire (0·104 in.)	52	—	51½
Mild Steel Tape (0·014 in.)	40½	—	40

NEW COMPANIES

Extracted from the Register issued by Jordan and Sons, Ltd., 116 Chancery Lane, W.C.2.

Warrington Refrigeration Co., Ltd., 14 Lime Tree Av, Padgate, Warrington. Manufacturers of and dealers in refrigerators and cold storage plant and machinery, ice and ice cream making machines, etc. Nom. cap.: £200. Dirs.: J. N. Henstock and E. W. Ostler.

W. H. Holland and Co., Ltd., Hollands Corner, Lodge Rd, Knowle. To take over business of garage proprietor and electrical engineer carried on at Knowle, Warwicks, by Wm. H. Holland. Nom. cap.: £10,000. Dirs.: W. H. Holland, Mrs. G. L. Holland, and W. H. C. Tooby-Desmond.

Winstanley Electric Ltd., 28 Old Hall Rd, Gatley, Cheadle, Ches. Manufacturers of and dealers in electrical apparatus, appliances and fittings, etc. Nom. cap.: £100. Dirs.: A. Winstanley, T. C. Winstanley, E. Winstanley, and E. Winstanley, senr.

Richardson and Freeman Ltd., Central Bldgs, 13 Glasshouse St, Nottingham. Service engineers of domestic, household and general electrical and other equipment and appliances, including washing and cleaning machines, refrigerators, etc. Nom. cap.: £1,000. Dirs.: W. A. Freeman, L. J. Richardson, L. W. Richardson and Ivy M. Robertson.

Neon, Signs and Lighting Ltd., 225 High Rd, Ilford, Essex. Nom. cap.: £1,000. Dirs.: F. H. Pues and E. Martin.

Pope and Luffman Ltd., 50 King's Parade Ave, Bristol 8. Electrical engineers, etc. Nom. cap.: £3,200. Dirs.: W. F. Pope and P. G. Luffman.

W. H. Shoebridge and Sons Ltd., 56 Upper Mounts, Northampton. Manufacturers of and dealers in electrical plant, machinery, equipment, generators, alternators, etc. Nom. cap.: £4,000. Dirs.: W. H. Shoebridge and Mrs. M. I. Shoebridge, W. R. E. Shoebridge and E. M. Shoebridge.

Richardson Electrics (Doncaster) Ltd., 1 Ings Rd, Doncaster. Electrical engineers and general electrical installations contractors, etc. Nom. cap.: £2,000. Dirs.: G. C. Richardson and P. F. DeMulder.

David G. Lewis (Birmingham) Ltd. Structural, mechanical, general and electrical engineers, etc. Nom. cap.: £10,000. Dirs.: D. G. Lewis, 213 Yardley Rd, Acocks Green, Birmingham 27, and Jean W. Lewis.

Gazette Announcements

COMPANIES ACTS

H. J. Gornall and Co., Ltd., electrical engineers. First and final dividends of 7⅝d. in £ payable at Official Receiver's Office, 20 Byrom St, Manchester, on 18 May.

Clyde Electric Installations (Manchester) Ltd. Meeting of members to take place at 1 Cooper St, Manchester, on 17 May at 11 a.m. to receive liquidators' report.

Ravenscourt Electrical and Radio Co. Ltd. Last day for receiving proofs in respect of intended dividends, 14 May. Liquidator is C. Cantor, Ling Hse, 10-13 Dominion St, South Place, E.C.2.

Ranalah Ltd. 7 May is last day for receiving proofs concerning intended dividends. T. J. M. Macleod, 4 Bucklersbury, E.C.4, is liquidator.

Burrells (Leeds) Ltd. Resolution for voluntary winding-up passed at meeting on 15 Apr, when P. H. Dobson, C.A., Permanent Hse, The Headrow, Leeds, was appointed liquidator.

Edolite Ltd. Petition for winding-up presented and directed to be heard at Royal Courts of Justice, London, on 3 May. Interested persons should communicate with A. E. Samuels and Co, 292 High Holborn, W.C.1, by 1 May.

Whittaker Electrical Products Ltd. Meeting of creditors will take place at 57 Blandford St, W.1, tomorrow (Fri) at 11.30 p.m.

BANKRUPTCY ACTS

Application for Discharge

Walsall. Cyril G. Clews, trading as Clews Electrical Co., at 226 Stafford St, Walsall. Hearing fixed for 20 May at The Court Hse, Lichfield St, Walsall.

Appointment of Trustee

Liverpool. Herbert Pryor, electronic engineer trading as W. Pryor at 36 Low Hill, Liverpool. Trustee is S. A. Henry, acc., 5 Rumford Place, Chapel St, Liverpool.

Intended Dividends

Bangor. David L. Smith, electrical engineer trading at Midland Bank Chambers, Cefn Rd, Old Colwyn, Denbigh. Last day for receiving proofs, 7 May. Trustee is R. P. Booth, C.A., 5 Rumford Place, Chapel St, Liverpool.

BUSINESS PROSPECTS

Home

Antrim. Erection of factory proposed by Ulster By-Products Ltd. at Glenavy.

Ashby U.D.C. It is proposed to build new estate in Tamworth Rd. It will comprise 267 houses, shops and other amenities.

Bray (Eire) U.D.C. Construction of 36 houses in Dublin Rd. E. J. Fennell, town clerk, Town Hall.

Camberwell. Scheme in hand for erection of county complement to Mary Datchelor Girls' school at estimated cost of £448,718. E. D. Lyons and L. Israel, architects, 26 Seymour St, W.1.

Carmarthen R.D.C. Erection of 36 houses on Orchard site, Pendine. Council's Surveyor, G. C. Thomas, 3 Spilman St.

TRADE NOTES

Co-ordination. The heating and welding activities of Metropolitan-Vickers Electrical Co. Ltd., have been further co-ordinated. As from 1 Apr, 1954, the Engineering Sections dealing with all forms of h.f. heating (induction furnaces, dielectric heating, etc.) as well as resistance heating using sheathed tubular elements were combined with the Welding Engineering Department, under its chief engineer, Mr C. F. Saunders.

Change of Address. The Glasgow office of H.M. Electrical Inspector of Factories, Mr J. W. Jones, M.I.E.E., has been removed to 37 Renfield Street, Glasgow, C.2. Telephone City 7481.

New Branch. Enfield Cables Ltd. have opened a new branch at 42 Hamilton Pl, Edinburgh; the telephone number is Caledonian 3041, and the branch manager is Mr J. T. F. Lippett.

Beama Contract Price Adjustment Formulæ.—*For Electrical Machinery and Equipment.* For purposes of calculating variations in: (*a*) "Rates of Pay"—the rate of pay for adult male labour at 17 Apr., 1954, shall be deemed to be 150s. 6d.; (*b*) "Cost of Material"—the index figure for materials used in the Electrical Machinery Industry published in the Board of Trade Journal on 17 Apr., 1954, is 155·7.

For Turbo-Generating and Allied Plant. For purposes of calculating variations in: (*a*) "Rates of Pay"—the rate of pay for adult male labour at 17 Apr., 1954, shall be deemed to be 150s. 6d.; (*b*) "Cost of Material"—the index figures published in the Board of Trade Journal on 17 Apr., 1954, are: Materials used in Mechanical Engineering Industries—146·7; "Blast Furnaces and Iron and Steel Melting and Rolling (40 and 41)"—143·4. The price of brass condenser tubes, ¾ in. o/d. 18 s.w.g. published in *The Metal Bulletin* on 16 Apr., 1954, is 3s. 7d. per lb.

For outstanding Contracts covered by the B.O.T. Intermediate Products Index. For purposes of calculating variations in (*a*) "Rates of Pay"—the rate of pay for adult male labour at 17 Apr., 1954, shall be deemed to be 150s. 6d.; (*b*) "Cost of Material"—the index figure for Intermediate Products published in the Board of Trade Journal on 17 Apr., 1954, is 353·0. (The rate of pay changed on 5 Apr. from 141s. 6d. to 150s. 6d. as a result of the wage increase agreed between the Engineering and Allied Employers' National Federation and the Conference of Shipbuilding and Engineering Unions.)

Croydon. T. Play and Sons propose to erect factory. Plans by R. S. Batstone, 44 Catherine Pl, London, S.W.1.

Eastcote (Middx.). Hostel for aged persons to be built in Field End Rd by Aged People's Housing Society. Esimated cost £35,000.

Durham. About £2,700 to be spent on rewiring Blaydon West county school. Also, expenditure of £500 approved on reorganisation of electrical equipment at Hebburn New Technical College.

Elstree (Herts). Regional Hospital Board has been asked to provide hospital and out-patients' department for Elstree and Boreham Wood.

Hampshire. Construction of fire station at Farnborough. County Architect, The Castle, Winchester.

Hartismere (Suff.) R.D.C. Plan for erection of 32 houses at Yaxley has been approved in principle.

Hayes and Harlington U.D.C. Construction of 60 flats on Barnhill estate. Engineer and Surveyor, Town Hall, Hayes, Middx.

Holborn. Great Universal Stores Ltd. have obtained £225,000 licence for new office block with shop in Tottenham Ct Rd. Architect is C. Edmund Wilford, 2 Green St, Park La, W.1. Tenders expected to be invited soon for erection of showrooms and offices in High Holborn and Warwick Ct for Lodyxon Investments Ltd. Robert Angell and Curtis, 38 Portland Pl, W.1, are architects, and licence for £70,000 has been issued.

Kidsgrove (Staffs). Edward Forshaw and Greaves, Old White Hart, Trinity St, Hanley, are architects for factory extensions for A. W. Hewetson Ltd., of Macclesfield.

Leek (Staffs) R.D.C. Erection of 76 dwellings on Norton Green site. Forshaw, Massey and Greaves, architects, 75 Trinity St, Hanley.

Maidenhead T.C. Block of flats for old people to be built on Spencers estate. Tenders may soon be invited for erection of 16 houses in Curls Lane, 14 on Larchfield estate, and 16 on Spencers estate.

Mayo (Eire). Construction of girls' and infants' school at Claremorris. 'Dermod J. O'Brien, quantity surveyor, 87 O'Connell St, Limerick.

Middlesex. Installation of electrical services in laboratories and workshops in extensions to Southall Technical College proposed at cost of about £1,705.

Peterborough T.C. Erection of 70 houses on Walton estate. City Engineer's Office, Town Hall.

Sale T.C. Construction of eight blocks of flats (32) on Baguley Lane estate, and two blocks (16) on Oaklea estate. Borough Engineer, Town Hall.

Sanderstead (Sur.). Harold Williams and Partners, 70 Victoria St, S.W.1, are surveyors for proposed erection of 320 houses, 20 shops with school site at Morley's Field for Whitgift Governors.

Surbiton T.C. Plans in hand for erection of two separate factories in Roebuck Rd for Wayne Kerr Engineering Co. Ltd., Tolworth Close.

Tottenham T.C. Approval given to erection of 40 dwellings and four shops in High Rd.

West Ham T.C. Erection of 30 maisonnettes in St. Thomas Rd; multiple store, offices, shops, maisonnettes and flats in Church St; and 13 houses in Shirley St. Borough Architect and Planning Officer, 70 West Ham La, E.15.

York T.C. Erection of 36 flats in Nicholas St. E. Firth, city arch., 8 St. Leonard's Pl.

Overseas

U.S.A. Unusual indoor lamps and fittings are required by Mr James J. Craig, lamp buyer of the Dayton Co., Minneapolis. Chandeliers, porch lamps and unusual table lamps are specified.

MEETINGS TO NOTE

THURSDAY, 29 APR.

I.E.E. (London Supply). — Forty-fifth Kelvin Lecture on "Physics of the Ionosphere," J. A. Ratcliffe. Savoy Place, W.C.2, 5.30 p.m.

INST. OF FUEL. "New Education Scheme of the Institute of Fuel." Dr D. T. A. Townend. Institution of Mechanical Engineers, Storey's Gate, S.W.1, 5.30 p.m.

FRIDAY, 30 APR.

INC. PLANT ENGRS. (Birmingham).—"Welding." F. A. Thomas. Imperial Hotel, 7.30 p.m.

SATURDAY, 1 MAY

I.E.E. (London Supply). — Visit to A.E.R.E. at Hanwell.

MONDAY, 3 MAY

I.E.E. (S. Midland).—"Safety in Use of Portable and Transportable Electrical Equipment in Industry," J. W. Bunting. James Watt Memorial Inst., Great Charles St, 6 p.m.

TUESDAY, 4 MAY

I.E.E. (N. Eastern).—Faraday lecture on "Electro Heat and Prosperity," O. W. Humphreys. City Hall, Newcastle, 7 p.m.

I.E.E. (N. Midland).—Annual meeting at B.E.A. offices, 1 Whitehall Rd, Leeds, 6.30 p.m.

I.E.E. (N. Western).—"Applications of Electrolytic Tank to Engineering Design Problems," H. Diggle and E. R. Hartill. Engineers' Club, Albert Sq, Manchester, 6.15 p.m.

A.S.E.E. (S.E. London).—"Tape Recording." Congregational Church Hall, Court Hall, Eltham, 8 p.m.

WEDNESDAY, 5 MAY

I.E.E. (London Radio).—"Reflection and Absorption of Radio Waves in Ionosphere," W. R. Piggott; "Absorption of Radio Waves reflected from Ionosphere at Oblique Incidence," W. J. G. Beynon. Savoy Place, W.C.2, 5.30 p.m.

I.E.E. (N. Lancs).—Annual meeting. "Continuity of Electricity Supply," H. Leyburn. Elect. Offices, Friargate, Preston, 7.15 p.m.

I.E.E. (S.W. Scotland).—Annual meeting at 39 Elmbank Cres, Glasgow, 7 p.m.

BRIT. INSTN. OF RADIO ENGINEERS (London).—"Microwave Measuring Equipment," P. M. Ratcliffe. School of Hygiene, Keppel St, W.C.1, 6.30 p.m.

THURSDAY, 6 MAY

I.E.E. (London).—"Electric Traction using Single-phase 50 c/s Current," M. Garrean; "Electric Locomotives on Valenciennes-Thionville Line," F. Nouvion. Savoy Place, W.C.2, 5.30 p.m.

I.E.E. (S.W. Scotland).—Faraday lecture on "Electro Heat and Prosperity," O. W. Humphreys. Royal Tech. College, Glasgow, 7 p.m.

BRIT. INSTN. OF RADIO ENGINEERS (Merseyside).—Annual meeting and technical film show. Elect. Offices, Whitechapel, Liverpool, 7 p.m.

Above photograph by courtesy of
The International Electrolytic Plant Co. Ltd.

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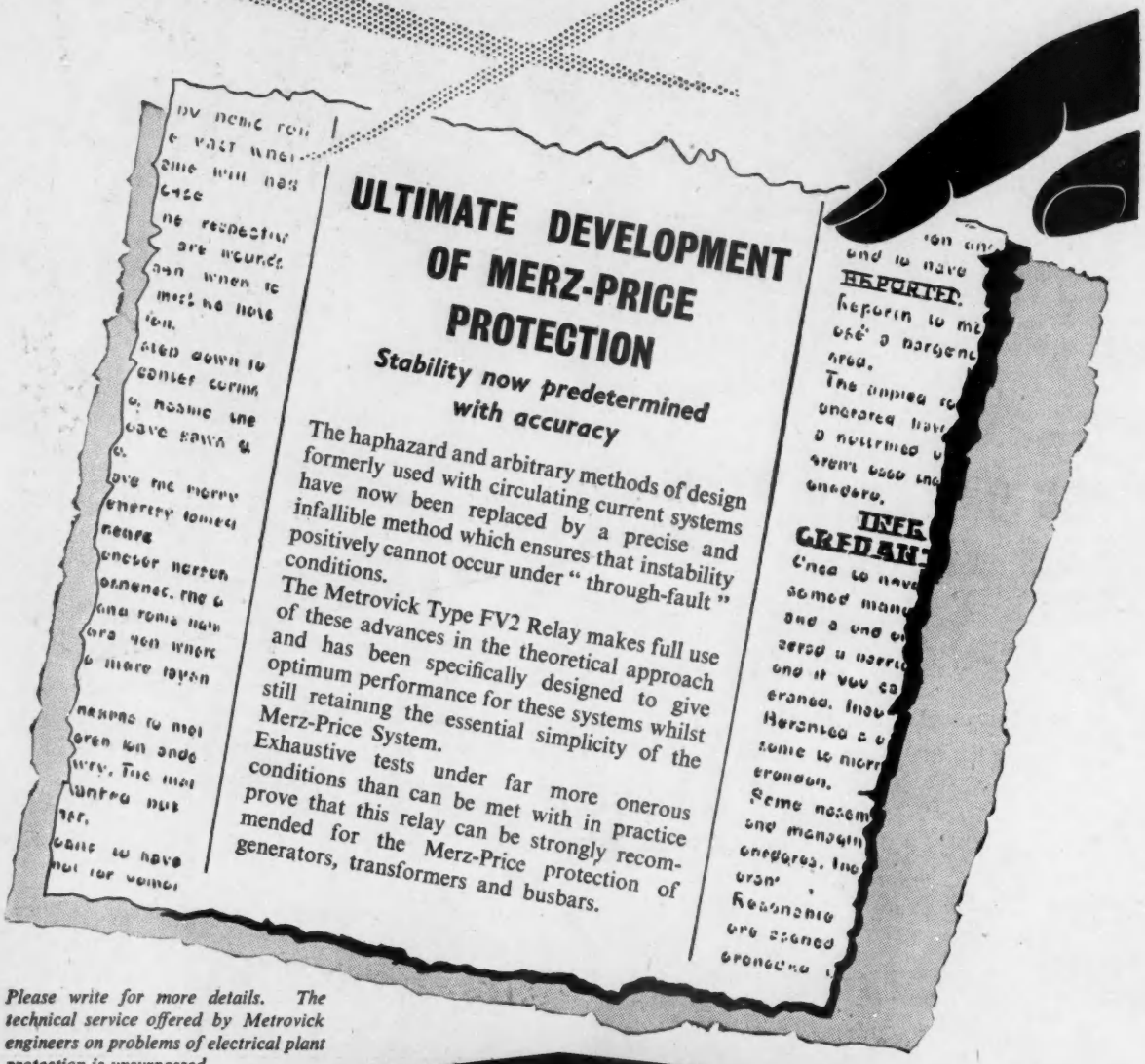
OVERSEAS REPRESENTATIVES

ARGENTINA: H. A. Roberts & Cia., S.R.L. Buenos Aires. AUSTRALIA: Hackbridge and Hewittic Electric Co., Ltd., Sydney. BELGIUM & LUXEMBOURG: M. Dorfman, 124, Avenue des Cerisiers, Woluwé 1, Brussels. BRAZIL: Oscar G. Mors, Caixa Postal 1280, Sao Paulo. CANADA: The Northern Electric Co. Ltd., Montreal, etc. CHILE: Ingenieria Electrica S.A.C., Santiago. EAST AFRICA: Gerald Hoe & Co., Private Bag, Nairobi. EGYPT: Giacomo Cohenca Fils, S.A.E., Cairo. FINLAND: Sähkö-ja Koneliike O.Y. Hermes, P. Esplanaadikatu 37, Helsinki. HOLLAND: J. Kater E.I., Ouderkerk a.d. Amstel, Amsteldijk Noord 103c. INDIA: Steam & Mining Equipment (India), Ltd., Calcutta; Easun Engineering Co., Ltd., Madras, 1. IRAQ: J. P. Bahoshy Bros., Baghdad. MALAYA, SINGAPORE & BORNEO: Harper, Gilfillan and Co., Ltd., Kuala Lumpur. NEW ZEALAND: Richardson, McCabe & Co., Ltd., Wellington, etc. PAKISTAN: James Finlay & Co., Ltd., Karachi. TRINIDAD & TOBAGO: Thomas Peake & Co., Port of Spain. TURKEY: Dr. H. Salim Oker, Karanfil Sokak 59, Ankara. URUGUAY: H. A. Roberts & Cia., S.A.U., Montevideo. U.S.A.: Electro Machinery Corporation, 50, Broad St., New York, 4.

New relay makes news!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TENDERS INVITED

GOVERNMENT OF KUWAIT

THE Government of Kuwait invite tenders for the supply F.O.B. Port country of origin of 11 kV Wood Pole Overhead Line Equipment for the Power Distribution System in Kuwait. Specifications will be available on 10 May for the submission of tenders by 14 June. Specifications must be obtained from the President of the Department of Electricity, Government of Kuwait, Kuwait, Persian Gulf, and will only be available to accredited Kuwaiti Agents. All further copies of the Specification will be issued by the Consulting Engineers in London at the request of the Government of Kuwait. Notice of the foregoing will be posted on the Notice Board of the Department of Electricity, Kuwait, on 1 May, 1954.

Ewbank and Partners Limited,
Engineering Consultants.
10/11 Grosvenor Pla,
London, S.W.1. (H 597)

BOROUGH OF PORT TALBOT
To Electrical Contractors

TENDERS are invited from Electrical Contractors for the execution of electrical installation works to Council Houses in the Borough of Port Talbot to approximately:

96 Houses at Goytre.

The work consists of the complete supply, erection, connecting up, testing of all cables, socket outlets, lighting points and control distribution units from the Supply Company terminals and in accordance with current edition of Regulations for the Electrical Equipment of Buildings published by the Institute of Electrical Engineers.

Specifications and Schedule for the scheme can be obtained on application from the Borough Engineer and Surveyor, Municipal Engineer and Surveyor, Municipal Buildings, Port Talbot.

Tenders, sealed and endorsed "Tender—Electrical Installation Goytre," to be delivered to the undersigned not later than 12 noon, 17 May, 1954.

W. KING DAVIES,
Municipal Buildings, Town Clerk.
Aberavon, Port Talbot. (H 567)

CITY AND COUNTY BOROUGH OF BELFAST
Electricity Department

ELECTRICITY (ESSENTIAL SUPPLIES) ACT (NORTHERN IRELAND) 1954

TENDERS are invited for the Supply, Delivery and Erection at Belfast Municipal Electric Power Station West of:

(a) Lighting and Heating Installation (Form of Tender N.1506). The first section of the work is required to be completed by 30 Sept., 1954, and the remainder of the work by 28 Feb., 1955.

(b) Portable Fire Fighting Appliances (Form of Tender N.1519). The in-

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stallation is required to be completed by 31 Aug., 1954.

Forms of Tender, Conditions, Specifications and Drawings, in quintuplicate, may be obtained from Messrs Merz and McLellan, Consulting Engineers, Carliol House, Newcastle upon Tyne 1, on payment of a deposit of Five Guineas in respect of each item (a) or (b). These deposits will be refunded provided bona fide tenders are lodged and not withdrawn. Extra copies of the contract documents may be obtained at One Guinea each; this sum will not be returnable. Cheques should be made payable to the Belfast Corporation Electricity Department.

Each tender, in quadruplicate, in sealed envelope marked "Tender for ..... Electricity Department" and endorsed with the name and address of the tenderer, must be addressed to the Town Clerk, City Hall, Belfast, so as to reach him not later than 4 p.m. on Friday, 28 May, in the case of Item (a) and Friday, 14 May, in the case of Item (b).

An official receipt must be obtained for each Tender delivered by hand. Tenders sent by post should be registered.

The lowest or any tender will not necessarily be accepted.

EYRE GORDON,
Northern Ireland Joint Chairman.
Electricity Committee.
East Bridge Street, Belfast.
23/4/54 (H 566)

APPOINTMENTS VACANT

Engagement of persons must be made through a Local Labour Office or Scheduled Employment Agency, if the applicant is a man aged 18-64, or a woman aged 18-59; unless the person concerned is excepted or the employment is in a managerial or professional capacity, or is otherwise excepted from the provisions of the Notification of Vacancies Order, 1952.

BRITISH ELECTRICITY AUTHORITY
South Wales Division

Vacancy No. 37/54

APPLICATIONS are invited for the following superannuable N.J.B. appointments in the Technical Department, Divisional Headquarters:

1. 3RD ASSISTANT ENGINEER. Salary AX/CX 4. £763/£949 per annum. Electrical Engineering Degree or H.N.C. Experience in the testing and commissioning of the electrical equipment in generating stations and 132 kV substations, investigation of electrical plant failures, etc. Experience in the erection of heavy electrical equipment an advantage.

2. GENERAL ASSISTANT ENGINEER. Salary AX/CX 8. £501/£675 per annum. Electrical Engineering Degree or H.N.C. Apprenticeship with large electrical manufacturers and experience that would fit the applicant for commissioning and handling electrical problems in power station and transmission systems desirable.

Application forms obtainable from Secretary, South Wales Division, British Electricity Authority, Twyn-y-fedwen Rd, Gabalfa, Cardiff, to be returned by 10 May, 1954. (H 522)

YORKSHIRE ELECTRICITY BOARD
Head Office

SECOND ASSISTANT ENGINEER

APPLICATIONS are invited for the post of Second Assistant Engineer in the Commercial Department at Head Office.

Applicants should have had a good general and technical education and be Corporate Members of the Institution of Electrical Engineers. They should have had experience in the application of electricity to the needs of domestic, commercial and industrial users and in contracting practice and the servicing and repair of electrical apparatus.

A knowledge of The Electricity Act, Supply Regulations, I.E.E. Regulations, Codes of Practice, etc., and a familiarity with Conditions of Tender, Safety Rules, B.S. Specifications, etc., is required.

Salary—N.J.B. Schedule C, Class AX/DX, Grade 2, £834/£970, rising to £1,053 per annum.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Secretary, Yorkshire Electricity Board, Wetherby Rd, Scarcroft, Leeds, not later than 13 May, 1954.

No. 5 (Wakefield) Sub-Area
Castleford District

INSTALLATION ENGINEER

The person appointed will be responsible for the organisation and administration of the contracting section including the supervision of manual workers. He must be capable of preparing specifications and estimates and supervising schemes for complete installation of all types and must have a thorough knowledge of the Electricity Supply Regulations and the I.E.E. Regulations for the Electrical Equipment of Buildings. Preference will be given to Corporate Members of the Institution of Electrical Engineers.

Salary—N.J.B. Class E, Grade 8, £619/£629 per annum.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Manager, No. 5 (Wakefield) Sub-Area, Yorkshire Electricity Board, 1a Denby Dale Rd, Wakefield, not later than 13 May, 1954.

No. 7 Grimsby Sub-Area

THIRD ASSISTANT ENGINEER (OPERATION AND MAINTENANCE)

Candidates should be fully experienced in the operation and maintenance of H.V. and L.V. overhead and underground transmission and distribution systems, substation plant and ancillary equipment. They should be suitably qualified and hold at least the Higher National Certificate in Electrical Engineering.

Salary—N.J.B. Class G, Grade 10, £608/£630 per annum.

Note: It is anticipated that from 1 Apr, 1954, the Sub-Area will be reclassified and the salary scale will them be £641/£667 per annum.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Manager, No. 7 (Grimsby) Sub-Area, Yorkshire Electricity Board, Moss Rd, Grimsby, not later than 13 May, 1954.

No. 3 (Sheffield) Sub-Area

ENGINEERING DRAUGHTSMAN

Applicants should preferably have had experience on mains recording with a public utility authority; be able to obtain particulars on site and compile accurate permanent records.

A knowledge of surveying and civil engineering, and the layout of transformer substations would be an advantage.

Salary—N.J.B. Schedule D, Grade 6, £433/£567 per annum.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Manager, No. 3 (Sheffield) Sub-Area, Yorkshire Electricity Board, Commercial St, Sheffield, not later than 13 May, 1954. (H 543)

THE SOUTH WEST SCOTLAND ELECTRICITY BOARD

Glasgow Sub-Area

APPLICATIONS are invited for the following appointments. The salaries and conditions of employment will be in accordance with the Agreement of the National Joint Board.

1. DISTRICT COMMERCIAL ENGINEER
(Central District)

Applicants should have experience in the utilisation of electrical energy in industrial, commercial and domestic premises, a knowledge of installation work, and be conversant with tariffs, sales and all aspects of service to consumers.

Salary Scale—Class G, Grade 3, £971/£1,014 per annum.

2. THIRD ASSISTANT ENGINEERS
(Planning and Development)

Applicants should have a sound engineering training with subsequent experience in the design and layout of large distribution systems at pressures up to and including 33 kV in a densely loaded industrial and residential area. A knowledge of the application of modern protective equipment and of the calculation of fault levels and preparation of load flow diagrams is necessary.

Salary Scale—Class L, Grade 10, £766/£794 per annum.

3. THIRD ASSISTANT ENGINEERS
(Construction)

Applicants should have a sound practical training with experience in the erection and commissioning of E.H.V. switchgear, transformers, protective gear and general substation constructional work.

Salary Scale—Class L, Grade 10, £766/£794 per annum.

For all the above positions preference will be given to candidates holding Corporate Membership of the Institution of Electrical Engineers or equivalent qualification.

The appointments will be superannuable under the British Electricity Authority and Area Boards Superannuation Scheme and the successful applicants may be subject to medical examination.

The successful candidates will be required to reside within reasonable distance of the Sub-Area Headquarters.

Applications should be made on the official form which may be obtained from the undersigned and which should be completed and returned not later than 22 May, 1954.

A. KELSO,
Manager.

75 Waterloo St,
Glasgow, C.2. (H 561)

LONDON ELECTRICITY BOARD

Senior Draughtsman and Engineering Draughtsman

APPLICATIONS are invited for the above positions in the Board's Contracting Section in Central London.

Applicants for the position of Senior Draughtsman should be capable of completing layouts of plant and the associated cabling for large industrial installations.

Applicants for the position of Engineering Draughtsman should be able to prepare diagrammatic from schematic layouts and to prepare the associated cable schedules.

The posts are graded under Schedule "D" of the National Joint Board agreement as Grade 5—£595. 7s. to £704. 11s. p.a. or Grade 6—£458 to £595. 7s. p.a. respectively, inclusive of London Allowance.

Application forms obtainable from Personnel Officer, 46 New Broad St, E.C.2. Please enclose addressed envelope and quote ref.: V/1730/T. (H 518)

NORTH OF SCOTLAND HYDRO-ELECTRIC BOARD

APPLICATIONS invited for AREA COMMERCIAL OFFICER for North Caledonia Area centred at Elgin, Morayshire. Salary N.J.M., Grade 1, £1,150/£1,300. Superanuation Scheme applicable. Application Form, obtainable from Area Manager, West Villa, Elgin, should be returned by 17 May, 1954. (H 565)

NORTH THAMES GAS BOARD

THE following Drawing Office Staff is required by the Board:

CHIEF ENGINEER'S DEPARTMENT,
WESTMINSTER, S.W.1.

(i) ELECTRICAL ENGINEER DESIGNER experienced in the preparation of schemes and contract specifications for small capacity generating plants, high and low tension switchgear, lighting installations, etc. Candidates should be corporate members of the Institution of Electrical Engineers, or hold an equivalent qualification, and be prepared to take charge of the appropriate Drawing Office Section. Starting salary £850/£950 per annum.

(ii) HEATING AND VENTILATING ASSISTANT experienced in the preparation of schemes and contract specifications for heating and ventilating installations associated with the service and administrative buildings on gas works. Candidates should preferably be corporate members of the Institution of Heating and Ventilating Engineers or hold an equivalent qualification. Starting salary £720/£820 per annum.

(iii) SENIOR DRAUGHTSMEN — two vacancies each class.
(*a*) Design and detailing of reinforced concrete structures and general engineering work.
(*b*) Design and layout of general process plant and all associated structural steelwork.
(*c*) Design of materials handling plant and the detailing of associated steelwork.

Candidates should preferably be corporate members of the Institution of Civil, Structural or Mechanical Engineers. Starting salary £720/£870 per annum.

CHEMICAL PRODUCTS WORKS,
BECKTON, E.6.

(iv) ELECTRICAL DRAUGHTSMAN. Candidates should be aged 25-30, with the Ordinary National Certificate and have had general Drawing Office experience. A sound background of industrial electrical services, plant and records is essential. Starting salary within the range £550/£650.

Starting salaries will be paid according to age, qualifications and experience and the successful candidates will be required to join the Staff Pension Scheme.

Applications, giving age and full particulars, must state which position is being applied for, and should be sent to the Staff Controller, North Thames Gas Board, 30 Kensington Church St, W.8, quoting reference 666/140. (H 517)

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

APPLICATIONS are invited for the following positions within the Division:

ENGINEERING DRAUGHTSMEN (CIVIL)
CONSTRUCTION DEPARTMENT
Vacancy No. 1/54/ET

Candidates should have experience in design and detail of reinforced concrete structures, piled and slab foundations for heavy plant, culverts, cable subways, etc., for general building construction drainage and sanitation schemes, associated with official and administrative buildings.

The salary will be in accordance with Grade 5 (£567/£671 per annum) or Grade 6 (£433/£567 per annum) of Schedule D of the National Joint Board Agreement.

ENGINEERING DRAUGHTSMEN
(MECHANICAL)
CONSTRUCTION DEPARTMENT
Vacancy No. 2/54/ET

Senior Draughtsmen are required in the Mechanical Section of the Construction Department at North Wilford Power Station. Candidates should have experience in one or more of the following:

(i) Design and layout of Power Station equipment, including turbo-alternators, boiler plant, coal and ash plant, and general station auxiliaries.

(ii) H.P. and L.P. steam and feed pipework. Condensing plant and feed heating systems.

(iii) Conveyor plant, coal handling systems

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auxiliary equipment.

and material handling of station

The salary will be in accordance with the National Joint Board Agreement, Grade 5 (£567/£671 per annum) and Grade 6 (£433/£567 per annum) of Schedule D according to experience.

ENGINEERING DRAUGHTSMEN
(ELECTRICAL)
CONSTRUCTION DEPARTMENT
Vacancy No. 3/54/ET

Candidates should have experience in the preparation of layouts and diagrams for the installation of E.H.T. and L.T. switchgear, transformers, E.H.T. and L.T. cables; knowledge of protective gear systems would be an advantage.

The salary will be in accordance with the National Joint Board Agreement Grade 5 (£567/£671 per annum) and Grade 6 (£433/£567 per annum) of Schedule D according to experience

GENERAL ASSISTANT ENGINEER
STAYTHORPE AND NORTHAMPTON
TRANSMISSION SECTIONS
Vacancy No. 63/54/ET

Applicants should have experience of the maintenance and operation of high voltage overhead lines, transformer and switchgear up to 132 kV and should preferably be Graduates of the Institution of Electrical Engineers.

Salary in accordance with Class AX/DX, Grade 8 (£501/£694 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications is 10 May, 1954.

SHIFT CHARGE ENGINEER
WARWICK POWER STATION
Vacancy No. 64/54/ET

Applicants should have experience in a responsible position of Power Station operation and be suitably qualified.

Salary in accordance with Class E, Grade 7 (£649/£681 per annum) of the National Joint Board Agreement.

The closing date for receipt of applications is 17 May, 1954.

DRAUGHTSMEN
TRANSMISSION DEPARTMENT
Vacancy No. 46/54/ET

Draughtsmen are required in the Transmission Department at this Divisional Headquarters. Experience on the design and construction of H.V. substations or overhead transmission lines an advantage.

Salary, according to experience and ability, within Grade 6 (£433/£567 per annum) or Grade 5 (£567/£671 per annum) of Schedule D of the National Joint Board Agreement.

Closing date for receipt of applications is 17 May, 1954.

The above positions will be pensionable within the provisions of the British Electricity Authority and Area Boards Superannuation Scheme.

Applications should be submitted on the official form which may be obtained from the Divisional Establishments Officer, British Electricity Authority, P.O. Box No. 25, British Electricity House, Barker Gate, Nottingham, and should be returned to the undersigned by the date stated. Please quote Vacancy Number.

L. F. JEFFREY,
Divisional Controller.
(H 581)

BRITISH ELECTRICITY AUTHORITY

(London Division)

REQUIRE a CHIEF GENERATION ENGINEER (CONSTRUCTION). Candidates should preferably be Corporate Members of one or more of the recognised Engineering Institutions. First hand experience in the design, layout and construction of Civil, Mechanical and Electrical Works for large new power stations is essential. Applicants should be capable administrators.

Salary will be according to qualifications and experience but will not be less than £2,350 p.a. which is provisional pending the negotiation of the permanent salary scale. Applications stating age, present position and salary and giving full details of qualifications and experience to D. Moffat, Director of Establishments, British Electricity Authority, Winsley St, London, W.1, by 8 May, 1954. Quote reference AE/477. (H 514)

EASTERN ELECTRICITY BOARD

APPLICATIONS are invited for the following vacancies:

Fens Sub-Area

DEMONSTRATOR—MARCH 44/54 R

Candidates should have had domestic training including electrical housecraft and should preferably hold the E.A.W. Certificate. They should be competent to plan and give cookery demonstrations, including lectures and advice to consumers on the utilisation of domestic electrical appliances. Previous experience in an Electricity Service Centre is desirable.

The salary will be in accordance with Grade 1 (£400 x £20—£480 x £10—£490) of the National Joint Council Salary Agreement, although progress beyond £440 will be subject to a certificate that the person concerned is capable of undertaking all the duties of the grade.

Apply to the Manager, Fens Sub-Area, Eastern Electricity Board, Milton Hall, Milton, Cambridge, within ten days of the appearance of this advertisement.

Northmet Sub-Area

GENERAL ASSISTANT ENGINEER—HERTFORD 21/54 R

Candidates should have had a sound training in electrical engineering and experience in the construction, operation and maintenance of underground and overhead systems.

The salary will be in accordance with Class E, Grade 11, of the National Joint Board Salary Agreement commencing at £524.

Apply to the District Manager—Hertford, Eastern Electricity Board, Bridgefoot, Ware, Herts, within fourteen days of the appearance of this advertisement.

Future salaries and conditions of service in respect of the above appointments will be in accordance with agreements made from time to time by the appropriate negotiating bodies.

The successful candidates will be required to contribute to a superannuation scheme and may be required to undergo a medical examination.

Applications, by letter, should contain details of age, education, qualifications, experience and present appointment and salary. (H 564)

BRITISH ELECTRICITY AUTHORITY
Merseyside and N. Wales Division

APPLICATIONS are invited for the appointment of MAINTENANCE ENGINEER (MECHANICAL) at the Clarence Dock Power Station. Salary £997/£1,041 per annum, N.J.B. Class L, Grade 6. Superannuable and subject to medical examination.

Applicants should be Associate Members of the Institution of Mechanical Engineers or possess equivalent qualifications and must have had wide experience in the maintenance of mechanical plant in a modern power station.

Application Forms may be obtained from the Divisional Secretary, Beaconsfield Rd, Woolton, Liverpool. Closing date: 7 May, 1954. (H 516)

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

SECTION ENGINEER (OPERATION) required to be based at Rhyl in the No. 4/5 Sub-Area. Salary £649/£681 p.a. (N.J.B. E/7). The district is comprised of both rural and urban areas.

Applicants should have experience in all branches of work associated with distribution, including design, construction and operation of E.H.T., H.T. and L.T. overhead and underground systems including indoor and outdoor substation equipment. They should preferably have the technical qualifications to enable them to become Chartered Electrical Engineers.

The appointment is superannuable and subject to medical examination.

Special application forms obtainable from the Manager, No. 4/5 Sub-Area, Electricity House, Rhostyllen, near Wrexham. Closing date: 10 May 1954. (H 512)

BRITISH ELECTRICITY AUTHORITY
Eastern Division

APPLICATIONS are invited for the positions of:

(1) POWER STATION SUPERINTENDENT
(2) DEPUTY POWER STATION SUPERINTENDENT

GOLDINGTON GENERATING STATION, BEDFORD.

Commencing salary for (1) will be Class G, Grade 1, of the N.J.B. Agreement, eventually rising to Class H.

Commencing salary for (2) will be Class G, Grade 3, of the N.J.B. Agreement, eventually rising to Class H.

This Station, which is at present under construction, is of the unit type and will comprise six sets of 30 MW capacity, steam conditions being 600 lb p.s.i., 850° F.

Applicants will be required to reside within a reasonable distance of the Power Station.

It will be of advantage if applicants have had experience in management, administration, joint consultation and labour relations, together with a knowledge of the commissioning, operation, maintenance and testing of plant in a generating station.

The boiler plant, which is of the water tube type, will be fired with pulverised fuel. There will be centralised control and high voltage electrical equipment.

Membership of a recognised Engineering Institution is desirable.

Application forms, which should be returned by 11 May, 1954, can be obtained from the Controller, Northmet House, Southgate, N.14.

W. N. C. CLINCH,
Controller.
(H 511)

BRITISH ELECTRICITY AUTHORITY
South East Scotland Division

ASSISTANT SECTION ENGINEER (Transmission) required for Edinburgh (Currie) Section.

Applicants must have had at least two years' experience in maintenance of 132 kV transmission lines, cables and substation equipment, and possess qualifications leading to Corporate Membership of the Institution of Electrical Engineers.

Salary £584/£745 (N.J.B. Class AX/BX/6) Pension Scheme. No Car Allowance. Transport provided.

Apply in writing by 14 May, 1954, stating age, qualifications and experience to Divisional Controller, British Electricity House, Portobello, Midlothian. (H 595)

SOUTHERN RHODESIA ELECTRICITY SUPPLY COMMISSION
Vacancy: Technical Assistant

APPLICATIONS are invited for the above vacancy which exists in the Commission's Concession District, and the duties will be those of assistant to the District Engineer. Graduate I.E.E. or equivalent qualification is essential. The appropriate salary scale is £605 by six increments to £964 per annum upon which a Cost of Living Allowance of approximately 7½% is paid at present. The point of entry into the scale will depend on experience and ability. A house is available at a rental of 12½% of basic salary.

Cabin Class steamship passages and first class rail fares from the coast will be paid, but must be refunded to the Commission if the successful applicant resigns within three years. The appointment will be subject to a probationary period of three months and a satisfactory medical certificate. A child allowance is paid and membership of the Pension Fund and Medical Aid Society is compulsory.

Selected applicants will be called for interview in the United Kingdom when full details of the conditions of service and duties involved will be explained.

Applications must be addressed to the Official Secretary, Rhodesia House, 429 Strand, London, W.C.2, and the envelope marked "Staff Vacancy—Electricity Supply Commission," so as to arrive not later than 28 May. (H 520)

NORTH OF SCOTLAND HYDRO-ELECTRIC BOARD
Dundee Area

FIRST ASSISTANT TECHNICAL ENGINEER

APPLICATIONS are invited from technically qualified and experienced engineers for the position of First Assistant to the Senior Technical Engineer at Dundee.

The duties will comprise the supervision of 132 kV and 33 kV system extensions and routine work embracing H.V. electrical plant and protective and supervisory gear. Assistance will also require to be given with the running of a research department conducting special investigations into electrical, mechanical and hydraulic problems.

Candidates must have a sound knowledge of electronic and power station engineering, including the installation and commissioning of 132 kV and 33 kV switchgear, transformers, protective and supervisory gear.

The salary will be in accordance with N.J.B. Schedule Class F, and the grade will be 4 or 3 according to qualifications and experience.

Full particulars of technical and practical training and experience should be forwarded to the undersigned not later than 31 May, 1954.

P. PHILIP, M.I.MECH.E., M.I.E.E.,
Area Manager,
Dudhope Crescent Rd, Dundee Area.
Dundee.
April, 1954. (H 526)

NORTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD

APPLICATIONS are invited from suitable candidates for the following posts in the Regional Engineer's Department:

ENGINEERING ASSISTANT (ELECTRICAL)

Applicants should have not less than Ordinary National Certificate in Electrical Engineering, and have experience of electrical work generally in hospitals.

Salary scale £440 at age 21 and over, x £25 (1) x £20 (8)—£625 plus London Weighting £10—£30. Commencing salary at minimum of scale.

ASSISTANT ENGINEER (ELECTRICAL)

Applicants should be Corporate Members of the Institution of Electrical Engineers. They must have a sound experience of electrical services including lifts, etc., in hospitals.

Salary scale £600 x £25 (7) x £30 (3)—£865, plus London Weighting £20—£40. Commencing salary above minimum may be paid subject to certain conditions.

ELECTRICAL ENGINEERING (DRAUGHTSMAN)

Applicants must have at least three years drawing office experience in electric lighting and power installation work, preferably applicable to hospitals. Site experience will be a decided advantage.

Salary scale £360 at age 21 and over, x £20 (4) x £25 (1) x £20 (4)—£545, plus London Weighting £10—£30. Commencing salary at minimum of scale. Apply to the Secretary, North West Metropolitan Regional Hospital Board, 11a Portland Place, W.1, by 17 May, with names of two referees. (H 560)

BRITISH ELECTRICITY AUTHORITY
Yorkshire Division

REQUIRE STATION CHEMIST at Mexborough Power Station, which is being extended to an ultimate capacity of 120 MW.

Salary range £697/£718 per annum, Class F, Grade 7, N.J.B. Agreement.

Applicants should hold the Higher National Certificate in Chemistry and have had experience of the testing and analysis of fuels, water and oils. Previous power station experience is desirable, especially with regard to modern water treatment plants.

Application forms obtainable from Divisional Secretary (Establishments), British Electricity Authority, Yorkshire Division, British Electricity House, St. Mary's Rd, Leeds, 7, to be returned within 14 days of the appearance of this advertisement.

G. A VOWLES,
Divisional Controller.
(H 563)

BRITISH ELECTRICITY AUTHORITY
South East Scotland Division

APPLICATIONS are invited for the position of SECOND ASSISTANT ENGINEER (MECHANICAL), Generation Construction Department, Divisional Headquarters.

Applicants should be experienced in the design and construction of turbo-generators, boilers, coal and ash handling plant, high pressure steam and water piping and other ancillary work.

Experience in the preparation of specifications, estimates, analysis of tenders, and a knowledge of thermo-dynamics and hydraulics will be a recommendation.

Preference will be given to applicants who hold a degree in Mechanical Engineering, are Corporate Members of the Institution of Mechanical Engineers, or possess equivalent qualifications.

The salary will be within Schedule C, Class AX/BX, Grade 2 (£834/£997 per annum) of the National Joint Board Agreement.

Applications stating age and experience to be submitted by Wednesday, 12 May, 1954, to the Divisional Controller, British Electricity Authority, South East Scotland Division, British Electricity House, Portobello, Midlothian.

J. F. FIELD,
Divisional Controller.

British Electricity House,
Portobello,
Midlothian. (H 555)

BRITISH ELECTRICITY AUTHORITY
Midlands Division

APPLICATIONS are invited for the following positions in the Generation (Operation) Department. N.J.B. service conditions, superannuable appointments, salaries within Schedule "A" of the Agreement:

(a) ASSISTANT MAINTENANCE ENGINEER (Mechanical) at Walsall Power Station, Grade G8, commencing at £678 per annum. (Vacancy No. 648MD.)

(b) SHIFT CHARGE ENGINEER at Stoke Power Station, Grade E7, commencing at £649 per annum. (Vacancy No. 649MD.)

Applicants for these positions should have received a sound technical training and power station practical experience, in particular for (a) in mechanical maintenance, and for (b) in the operation and maintenance of steam generating plant and main switchgear. Appropriate qualifications an advantage.

Apply on form AE6, quoting the vacancy number, available from the Establishments Officer, 53 Wake Green Rd, Moseley, Birmingham 13, by 15 May, 1954. (H 571)

SOUTH WEST SCOTLAND ELECTRICITY BOARD
Lanarkshire Sub Area

APPOINTMENT OF 3RD ASSISTANT DISTRICT ENGINEER
NEWLANDS DISTRICT

APPLICATIONS are invited for the above appointment.

Applicants should preferably be Graduates of the Institution of Electrical Engineers, or hold equivalent qualifications. They should have had a sound engineering training with subsequent experience in the operation and maintenance of H.V. and L.V. switchgear and overhead and underground distribution systems.

The Salary and Conditions of Service will be in accordance with the National Joint Board Agreement, Schedule "A." The present Classification and Grading is E9, salary £587/£600 per annum, which will be subject to the statutory deductions, including superannuation. The successful candidate will require to reside with a reasonable distance of the Newlands District Offices.

Application Forms, which may be obtained from the undersigned, should be returned to this office within 14 days of the date of this advertisement.

DUGALD SMITH,
Manager.

137 Almada St,
Hamilton. (H 533)

MIDLANDS ELECTRICITY BOARD

FIRST ASSISTANT DISTRICT COMMERCIAL ENGINEER required in the Sutton Coldfield and North East Birmingham District of the Birmingham and District Sub-Area. Applicants should possess a sound technical training and have a wide practical experience of industrial, commercial and domestic installations and their electrical requirements. The duties will include advice on utilisation, negotiations with consumers, preparation of estimates, etc., planning and supervision of contracting work, service centres and maintenance of consumer service. Technical qualifications desirable. Salary £833/£866 per annum (N.J.B. Grade H.6). Superannuable.

Apply, in writing, within 14 days stating age, experience, present salary and position to Emil Braathen, Sub-Area Manager, Midlands Electricity Board, 14 Dale, Birmingham 4.

A. STEPHENS,
Secretary.
(H 524)

HER MAJESTY'S COLONIAL SERVICE

APPLICATIONS are invited from RADIO ENGINEERS for eventual appointment as broadcasting engineers in Colonial Government broadcasting services.

Applicants should be over the age of 28 and be Graduates of the Institution of Electrical Engineers or in possession of an Engineering Degree or Diploma recognised as granting exemption from Sections A and B of the Institution's examination. Experience in the radio industry or in the radio branches of Her Majesty's Services for at least two years is necessary but applicants need not have experience directly related to broadcasting.

Successful applicants will receive operational training in the B.B.C. and at any time within two years after initial engagement, they will be required to take up contract appointments with a Colonial Government in any part of the world, as broadcasting engineers. Choice of territory will be given where possible, but is not guaranteed.

Total emoluments during training in the United Kingdom, £800 per annum. Salary on appointment to a Colonial territory will not be less than £1,000 per annum, plus such allowances as are prescribed under the regulations of the Colony concerned.

Apply in writing to the Director of Recruitment, Colonial Office, Great Smith St, S.W.1, giving briefly age, qualifications and experience. Mention the Reference Number CDE 96/02. (H 579)

MIDLANDS ELECTRICITY BOARD

GENERAL ASSISTANT DISTRICT COMMERCIAL ENGINEER required at the Wellington District of the Shropshire and Herefordshire Sub-Area. Duties include advising consumers in respect of supplies and extensions, and the sale and installation of domestic and commercial electrical equipment, and the wiring associated therewith. Technical qualifications desirable. Salary £524/£540 per annum (N.J.B. E.11). Superannuable.

Apply, in writing, within 14 days, stating age, experience, present position and salary to Mr W. Winwood, Sub-Area Manager, Midlands Electricity Board, Spring Gardens, Ditherington, Shrewsbury.

A. STEPHENS,
Secretary.
(H 562)

SOUTH-EAST ESSEX TECHNICAL COLLEGE
Longbridge Rd, Dagenham

REQUIRED by September 1954, LECTURER in Electrical Engineering, to teach Electricity Supply and Electrical Measurements to Higher National Certificate standard. Salary scale under review (at present £940 x £25—£1,040 (man) plus London allowance).

Details and application forms from the Clerk to the Governors at the College (S.A.E.), returnable to him by the 14 May, 1954. (H 523)

SOUTH WALES ELECTRICITY BOARD

REQUIRE COMMERCIAL ASSISTANTS in the following districts of the Western Sub-Area:

District 102 (Fishguard)—Class B.
District 104 (Lampeter)—Class C.
District 105 (Llandilo)—Class C.
District 107 (Tenby)—Class B.

Applicants must have had experience in the application of electricity to domestic and commercial premises and all general purposes.

Salary for the positions will be in accordance either with Class B Grade 9 (£496/£508/£520) or Class C Grade 10 (£502/£512/£521) of N.J.B. Schedule.

Applications stating preference and giving age, present position and salary, qualifications, experience and three referees, to be addressed to the Secretary to arrive by 8 May, 1954.

D. G. DODDS,
Secretary.

St. Mellons,
Cardiff. (H 542)

SOUTH WALES ELECTRICITY BOARD

APPLICATIONS invited for positions of ASSISTANT ENGINEER in the following districts of the Western Sub-Area:

District 101/2 (Haverfordwest)—Class D.
District 103 (Cardigan)—Class C.
District 104 (Lampeter)—Class C.
District 105/6 (Carmarthen)—Class D.

Applicants should have sound experience of the layout and construction of mains and substations in mainly rural areas.

Salary for the positions will be in accordance either with Class C, Grade 7 (£599/£611/£622) or Class D Grade 7 (£633/£638/£643) of N.J.B. Schedule.

Applications stating preference and giving age, present position and salary, qualifications, experience and three referees, to be addressed to the Secretary to arrive by 8 May, 1954.

D. G. DODDS,
Secretary.

St. Mellons,
Cardiff. (H 541)

THE SOUTH WEST SCOTLAND ELECTRICITY BOARD

APPLICATIONS are invited for appointments as FIRST ASSISTANT DISTRICT COMMERCIAL ENGINEER in the undernoted Districts:

Glasgow Sub-Area — Central District.
Glasgow Sub-Area — Southern District.
Clyde Sub-Area — Clydebank District.

The posts are on Class G, Grade 6, of the National Joint Board Agreement. Salary scale—£787 to £818 per annum.

Applicants should be Engineers with commercial experience and, preferably, should hold an appropriate engineering qualification.

The appointments are superannuable and may be subject to medical examination.

Forms of application, which may be obtained from the applicant's appropriate Officer or the undersigned, should be completed and returned to the undersigned not later than 21 May, 1954. Applicants should indicate the District or Districts applied for.

J. MEEK,
Secretary.

62 Dalziel Drive,
Glasgow, S.1. (H 602)

THE NORTH EASTERN ELECTRICITY BOARD
Wear Sub-Area

APPLICATIONS are invited for the appointment of THIRD ASSISTANT DISTRICT ENGINEER, Crook District. Salary—Schedule "A," Class "D," Grade 9, £561/£578, N.J.B. Conditions of Service.

Applications stating age, qualifications and experience, should be forwarded to the Secretary (Establishments), The North Eastern Electricity Board, Carliol House, Newcastle upon Tyne 1, within ten days of the appearance of this advertisement.

(H 601)

BRITISH ELECTRICITY AUTHORITY
Merseyside and North Wales Division

APPLICATIONS are invited for the appointment of MAINTENANCE ENGINEER (ELECTRICAL) at the Percival Lane Power Station, Runcorn, Cheshire. Salary £787/£818 per annum, Class G, Grade 6, N.J.B. Superannuable and subject to medical examination.

Candidates should preferably be Associate Members of the Institution of Electrical Engineers or possess equivalent qualifications and must have had a wide experience in the maintenance of modern power station plant.

Application Forms from the Establishment Department, Beaconsfield Rd, Woolton, Liverpool. Closing date: 10 May, 1954. (H 569)

YORKSHIRE ELECTRICITY BOARD
No. 5 (Wakefield) Sub-Area

GENERAL ASSISTANT ENGINEER (DEVELOPMENT)

APPLICANTS must be capable of carrying out general commercial development work concerned with the utilisation of electricity for agricultural and horticultural purposes. They should have had previous experience in consumer surveys, canvassing, negotiations and advice concerning tariffs, appliance sales, installations, exhibitions and general publicity work.

The successful applicant's normal place of employment will be either the Doncaster District Office or the Castleford District Office.

Salary—N.J.B. Class K, Grade 13, £583/£605 per annum.

WAKEFIELD DISTRICT
GENERAL ASSISTANT DISTRICT ENGINEER

Applicants must have had a sound practical training with experience in the construction, operation and maintenance of H.V. and M.V. overhead and underground distribution networks, substation plant and ancillary equipment.

Applicants must hold a current driving licence, be prepared to reside in the District and undertake standby duties.

Preference will be given to those who are Corporate Members of the Institution of Electrical Engineers or who hold equivalent qualifications.

Salary—N.J.B. Class F, Grade 11, £548/£565 per annum.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Manager, No. 5 (Wakefield) Sub-Area, Yorkshire Electricity Board, 1a Denby Dale Rd, Wakefield, not later than 6 May, 1954. (H 500)

BRITISH ELECTRICITY AUTHORITY
Midlands Division

BOILER HOUSE SHIFT CHARGE ENGINEER is required at Hams Hall "A" Power Station. N.J.B. service conditions, superannuable appointment, salary within Schedule "A," Grade J9 commencing at £719 per annum.

Experience in the operation and maintenance of steam generating plant and main switchgear in a large power station is required. Appropriate technical qualifications an advantage.

Apply on form AE6, quoting Vacancy No. 647MD, available from the Establishments Officer, 53 Wake Green Rd, Moseley, Birmingham 13, by 8 May, 1954. (H 519)

BRITISH ELECTRICITY AUTHORITY
South Western Division

THIRD ASSISTANT ENGINEER required in the Technical Department (Meter Section) Bristol.

Superannuation Scheme. Salary N.J.B. Class AX/CX, Grade 5, £649/£835.

Applicants should have manufacturing and testing experience of electrical instruments and meters, and possess qualifications leading to A.M.I.E.E. Some knowledge of alternator acceptance tests and ability to drive a car desirable.

Applications on Form A.E.6/ACT, obtainable from the Divisional Secretary, 26 Oakfield Rd, Bristol 8, should be completed and returned by 10 May, 1954. (H 521)

BRITISH ELECTRICITY AUTHORITY
London Division

APPLICATIONS are invited for the following superannuable posts. Conditions of service in accordance with N.J.B. Agreement, Schedule A. Salary includes London Allowance. Qualifications entitling to Graduate Membership of the I.E.E. or I.Mech.E. an advantage.

JUNIOR ENGINEER
(3·3 kV Switchboard)
BATTERSEA GENERATING STATION
Vacancy No. 54/303

Sound engineering training followed by some experience in a modern Power Station. Salary—Class M, Grade 17/3=£574. 7s. p.a.

INSTRUMENT ENGINEER—
WEST HAM GENERATING STATION
Vacancy No. 54/304

Experience necessary in maintenance, testing and calibration of all types of Power Station electrical and mechanical instruments. Salary—Class H, Grade 12=£593. 5s. p.a.

Applications, quoting vacancy number, may be made on form obtainable from Divisional Secretary, British Electricity House Great Portland St, W.1, and be received within 14 days of this advertisement. (H 557)

APPLICATIONS are invited by The English Electric Co. Ltd., Liverpool, from ENGINEERS with good technical qualifications and with design and development experience in one or more of the following:

(a) Domestic Electric Cookers.
(b) Cooker Hotplates—solid and/or radiant.
(c) Thermostatic switches, process timers, solenoid operated switches, etc.
(d) Domestic laundry equipment.
(e) Sealed refrigerator compressors.

The vacancies occur in the Engineering Departments of the Company's Domestic Appliance Division and suitable applicants will be engaged in senior positions, in which they will be required to carry their full share of responsibility for the design and development of entirely new products. Salaries will be commensurate with the applicant's experience, and the degree of responsibiilty called for by the position for which he is chosen. Reply stating age, experience, qualifications, and quoting ref. 452H, to Dept. C.P.S., 336/7, Strand, W.C.2. (H 559)

A SENIOR DRAUGHTSMAN is required in South Wales by McLellan and Partners, Consulting Engineers, to prepare layouts and diagrams for heavy electrical plant, switchgear, cabling, etc. Salary range £650/£800, plus living out allowance. Write stating age, education, qualifications, experience and salary required to 32, Victoria St, S.W.1. (H 538)

ASSISTANT INSULATION ENGINEERS: Young Engineers possessing a degree or Higher National Certificate in Electrical Engineering are required to undertake experimental and theoretical investigations in connection with insulating materials, techniques and associated problems. Experience of similar work desirable, but other applicants with suitable qualifications will be considered for training. Salary according to age, qualifications and experience. Apply with full particulars to the Chief Engineer, A. Reyrolle and Company Ltd., Hebburn, Co. Durham. (H 431)

A QUALIFIED ELECTRICAL ENGINEER or Technical Representative required by a leading firm of Manufacturers to call upon Architects and Consulting Engineers in the London area. Full particulars, including age and experience to —Box 7606, c/o Charles Barker and Sons Ltd., 31 Budge Row, London, E.C.4. (H 544)

ASSISTANT ENGINEER immediately for London Office of consulting engineers and contractors, with experience in the preparation of specifications and examination of tenders covering all main mechanical plant for large steam power stations. Age, details of training, salary to—Box E.T. 626, c/o 191 Gresham House, E.C.2. (H 568)

ASSISTANT WORKS MANAGER required by well known Domestic Appliance Manufacturers in Home Counties. Applicants should be between 35 and 40 years of age and have good technical qualifications, backed by wide experience in mass production, having held position of responsibility. Should be conversant with modern production methods, and have knowledge of press and sheet metal work, welding assembly and finishing processes. Replies, which will be dealt with in confidence, should give full particulars of education, positions held and salaries. Starting salary will be commensurate with age and experience and there are good prospects for the right man.—Box No. 3497, Electrical Times. (H 589)

ASSISTANT ELECTRICAL ENGINEERS for service in Malaya. Minimum technical qualification—Ordinary National Certificate. Age 24 to 33, single. To have served full apprenticeship and have had subsequent experience in installation, operation and maintenance of H.T. and L.T. plant including overhead transmission lines. A knowledge of D.C. plant an advantage. First contract for 3 years which is renewable. Commencing basic salary £560 per annum plus allowance towards cost of living of £280 per annum. Generous Provident Fund and Pension Scheme, free furnished quarters and free medical and dental treatment. Six months' home leave on full pay plus half cost of living allowance if contract renewed. Company pays cost of passage to and from Malaya.

Written application with full particulars of age, training and experience and copies only of testimonials to Box 715, Walter Skinner Ltd., 20 Copthall Ave, London, E.C.2. (H 574)

CONSULTING Engineers require the following staff:

(a) ELECTRICAL ENGINEER/DRAUGHTSMAN, age 25 to 30 years. Applicants should be experienced in substation plant, power and lighting layouts for heavy industrial installations. Preferably of H.N.C. standard.

(b) DRAUGHTSMAN, age 20 to 24 years having completed National Service and preferably with O.N.C. Some knowledge of electrical installation work an advantage.

(c) OFFICE JUNIOR, age 16 years for tracing and general office duties. One day off each week if attending a recognised course of study.

Apply in writing stating salary required to Sir Bruce White, Wolfe Barry and Partners, 1 Lygon Place, Westminster, London, S.W.1. (H 531)

COOKERY DEMONSTRATOR. The Parkinson Stove Company invites applications for the position of Cookery Demonstrator. Applicants should possess a recognised Diploma in Domestic Science or equivalent qualification with considerable experience in cookery demonstration. These demonstrations often have to be given to outside organisations and applicants must also be prepared to travel although resident, or prepared to reside, in the Birmingham area. A flair for compiling and testing new recipes would be an advantage. Letters in confidence to Personnel Manager, Iron Lane, Stechford, Birmingham 33. (H 529)

CONTACTOR Switchgear Ltd. ENGINEERS required for Engineering Department for control gear applications up to 1,000 h.p. low and high tension.

The Company operates a contributory pension scheme and will share cost of removal in approved cases. Applicants should have completed their National Service and be preferably not over 45. Write in confidence to the Secretary, Moorfield Rd, Off Upper Villiers St, Wolverhampton. (H 599)

Box No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London, W.2.

BROOKHIRST SWITCHGEAR
LIMITED. (CHESTER)

Manufacturers of electric motor control gear, invite applications for the following vacancies:

(1) APPLICATION ENGINEERS.—Duties include handling of contracts involving technical correspondence, discussions with customers, approving design drawings, preparation of schemes, manufacturing specifications and installation and operation instructions. Applicants should have had Works and Drawing Office experience and be in possession of H.N.C. or equivalent. Commencing salaries according to age and experience.

(2) DEVELOPMENT ENGINEERS.—For the development and testing of prototype assemblies and components. Applicants should have had experience with electro-mechanical and/or electronic devices with technical standard of H.N.C. or equivalent.

(3) DESIGNER DRAUGHTSMEN.—For the preparation of original designs of all types of control gear, including relays and contactors. Applicants should have had previous design experience; knowledge of the mechanical and electrical aspects of control gear an advantage. A technical standard of H.N.C. level desirable. Commencing salaries according to age and experience.

(4) DRAUGHTSMEN. — Vacancies exist for both senior and junior draughtsmen for the preparation of contract drawings for all types of electric control gear. For the senior appointments previous experience on comparable work is desirable, but training will be given to other suitable applicants who have had adequate practical experience and technical training.

All appointments are permanent and pensionable. Apply giving full particulars of age, training, experience and salary required to:

PERSONNEL MANAGER,
BROOKHIRST SWITCHGEAR LTD.,
Northgate Works, Chester.

(H 475)

DESIGN ENGINEER required for development of structures for Overhead Electrical Transmission Lines, Railway Electrification, Aerial Ropeways, Floodlight Towers, etc.

Successful applicant, who should have had a thorough theoretical training and practical experience in the design and application of these structures, would be expected to control and organise his own Department.

Good prospects are offered to a man of initiative and resource.—Box No. 3429, Electrical Times. (H 358)

DRAUGHTSMEN required by The General Electric Co., Ltd., at their Head Office in Kingsway (for airfield electrification schemes). Applicants must have had a technical education up to O.N.C. standard—preferably H.N.C.—and be in the age group 25/30 years. Apply in writing, quoting reference "B.D." to The Staff Manager, Magnet House, Kingsway, London, W.C.2. (H 572)

DESIGN DRAUGHTSMAN required by manufacturers of Automatic Electric Motor Control Gear. Applicants must have experience of the design of Contactors and Relays and associated gear. Company situated one hour N.W. of London, excellent working conditions, 5-day week, Canteen facilities. Write giving details of age, experience, qualifications and salary required to—Box No. 3501, Electrical Times. (H 591)

DRAUGHTSMAN, Senior, for Contractors office. Knowledge of installation work would be useful. Phœnix Electrical Co. (London) Ltd., 16-18, Marshalsea Rd, S.E.1. (H 536)

DRAUGHTSMEN required for design and development of high voltage and low voltage high rupturing capacity fuses. Interesting position for men with experience, initiative and ability to interpret test reports. Apply, stating age, experience and salary required to the Staff Manager, The General Electric Co. Ltd., Witton, Birmingham 6. (H 532)

ELECTRICAL DRAUGHTSMAN, 25-30, H.N.C. standard, preferably familiar with heavy industrial plant, practice and layout. Knowledge of distribution systems up to 3,300 V. A.C. and D.C. motor control schemes and preparation of schematic diagrams. Salary depending on age and experience. Superannuation scheme. Applications to be received by 17 May addressed to Electrical Engineer, Guest Keen Baldwins Iron and Steel Works, Cardiff. (H 537)

ELECTRICIAN wanted by small factory in Birmingham area, to take sole charge of maintenance of approx. 150 motors, ¼ h.p.—25 h.p., switchgear and lighting installation.—Box No. 3503, Electrical Times. (H 592)

ELECTRICAL Engineers and Contractors invite applications for the post of Contractor's Estimating and Supervising ENGINEER in their Manchester Office. Applicants should be experienced in handling large electrical contracts from the enquiry stage to final bill. Details stating age, experience and salary required to—Box No. 3493, Electrical Times. (H 580)

EXPERIENCED ELECTRICAL ENGINEER required. Leading manufacturers of high voltage equipment in North West England offer attractive position to Graduate possessing initiative and capable of undertaking varied investigational and development work. Apply giving details of education and career and stating salary required to—Box No. 3487, Electrical Times. (H 552)

EXPERIENCED ELECTRICAL ENGINEER required by East Midlands concern for development, supervision and control of its Sections specialising in Distribution Equipment and Domestic Appliances. Mechanical Engineering knowledge advantageous but not essential. Apply stating age, qualifications, experience and salary required.—Box No. 3509, Electrical Times. (H 598)

ELECTRICAL FOREMAN reqd. for staff job with newly established company with HQ in London area. Experience in contracting work essential. City and Guilds or similar qualification preferred.—Box No. 3485, Electrical Times. (H 551)

ENGINEERS wanted by large firm of Power Cable Installation Contractors, preferably with some practical experience of outside contract work. Age 25/35. Pension Fund. Write Box No. 2064, c/o Whites Ltd., 72/8 Fleet St, London, E.C.4, quoting reference C/25/54. (H 600)

FERRANTI LTD., Transformer Dept., Hollinwood, have a number of vacancies in the Research and Development sections for young TECHNICAL ASSISTANTS of approximately H.N.C. standard in Electrical Engineering for general experimental work in these sections.

The appointments would be to the permanent staff and afford the opportunity of participating in a wide range of interesting investigations with good prospects of promotion.

Reference TRD.

The Company has a Staff Pension Scheme. Application forms from Mr R. J. Hebbert, Staff Manager, Ferranti Ltd., Hollinwood, Lancs.

Please quote reference. (H 530)

GRADUATE ELECTRICAL ENGINEER about 25 years of age required by well known firm in the Manchester area. Attractive position for man having drive and ability to make constructive contributions to the development of high voltage gear. Applications giving full details to—Box No. 3489, Electrical Times. (H 553)

JUNIOR required for the Estimating Dept. of a firm manufacturing electric motors and allied apparatus to assist in the preparation of tenders and quotations. Preferably with some works and test bed experience. London District. Give full details of experience and salary required. —Box No. 3479, Electrical Times. (H548)

JUNIOR ENGINEERS with experience of surveying, planning and erecting overhead transmission and distribution lines on wood poles, are required by the Contract Dept. of well-known Cable Manufacturers. Applicants should be 20—30 years of age, willing to travel and work in any part of the British Isles. Salary will be according to qualifications and experience, which should be detailed in applications to—Box No. 3481, Electrical Times. (H 549)

JOHNSON AND PHILLIPS LIMITED have vacancies in their cable ESTIMATING DEPARTMENT, preference will be given to men experienced in preparation of estimates of cost of rubber insulated cables and flexibles also thermoplastic cables. Applications giving age, experience and salary expected should be addressed to Employment Manager, Messrs Johnson and Phillips Limited, Victoria Way, Charlton, London, S.E.7. (H 528)

KENT COUNTY COUNCIL require a CHARTERED ELECTRICAL ENGINEER with good experience in the preparation of schemes, specifications and estimates for electrical installation work at a salary from £785 to £860 a year. Details and forms of application obtainable from the County Architect, Springfield, Maidstone. (H 556)

LARGE ELECTRICAL MANUFACTURERS require qualified Sales Engineers for London Office appointments. Must be to H.N.C. or A.M.I.E.E. standard with previous sales and commercial experience covering Turbines, Transformers, Switchgear and Electrical Machines. Minimum age 35. Permanent appointment with good salary, provident fund and use of office car. Write in confidence to—Box No. 3499, Electrical Times. (H 590)

LAND SURVEYOR required to carry out instrument survey on overhead power line routes. Apply to James Kilpatrick and Son, Limited, Kelvin House, River Cart Walk, Paisley. (H 539)

JOHNSON & PHILLIPS
LIMITED
CONTRACT ENGINEER
Karachi, Pakistan

Applications are invited for ELECTRICAL ENGINEERS to take full charge of the INSTALLATION CONTRACT and CONSTRUCTION activities associated with the Company's Branch in Pakistan. The Branch is situated in Karachi where the Company also has a Switchgear Factory.

Applicants should have had considerable commercial, technical and practical experience in the planning, estimating, tendering and supervision on site of industrial electrification schemes and cable and other projects employing products such as those manufactured by the Company.

The appointment is a senior permanent one and a generous salary and good U.K. leave and other conditions of employment will be offered to a suitable candidate.

Candidates must be medically fit for service in the tropics and preferably not more than 40 years old.

Applications (which will be treated as strictly confidential) should be as complete as possible and should be addressed to the

Managing Director
Johnson & Phillips Limited
Charlton, London, S.E.7

(H 547p)

THE ENGLISH ELECTRIC COMPANY
Stafford

Invite applications from Engineers with a degree or H.N.C. in electrical subjects for APPLICATIONS ENGINEERING APPOINTMENTS concerned with the application of motors, drives and control gear to rolling mills and other metal industries equipment. Applicants should preferably have had experience of an electrical manufacturing industry. A knowledge of steel works or steel works machinery would be an advantage. Please write giving full details and quoting reference
1301 to Dept. C.P.S., 336/7 Strand, W.C.2
(H 545p)

MECHANICAL ENGINEER. The Skefco Ball Bearing Co., Ltd., of Luton, Beds, have a vacancy for an engineer to take charge of a section of their technical department dealing with the application of rolling bearings to electrical machinery. Applicants should preferably have academic qualifications and should have served an apprenticeship or gained practical experience in the Electrical Industry. A good salary is offered to a hard-working man under 40 years of age with the right qualifications.
Replies, which will be treated in the strictest confidence, should be addressed to the Technical Manager. (H 486)

PROGRESS in manufacturing methods and techniques in connection with heavy rotating electrical machines and Mercury Arc Rectifiers have led to several interesting vacancies in The English Electric Co., Ltd., Stafford, for MANUFACTURING or METHODS ENGINEERS and PRODUCT DEVELOPMENT ENGINEERS. Applications are invited from engineers working in either of these capacities and from those who have a sound background of practical experience in a manufacturing industry, at least O.N.C. and a desire to enter either of these important branches of engineering. Please write quoting ref. 1225B to Dept. C.P.S., 336/7 Strand, W.C.2. (H 421)

PLANNING AND COSTING EXECUTIVE. Experienced man required light electrical engineering covering F.H.P. Motors, Power Presses, Time Study and Process Planning. Advantage knowledge procedure Home and Foreign Electrical Standards approval submissions. Enfield district. Write giving details of experience and when free to commence duties. Box 126, Aldridge Advertising, 1 Whitefriars St, London, E.C.4. (H 582)

GOOD HOUSEKEEPING INSTITUTE

APPLICATIONS are invited for a MALE ASSISTANT in the Engineering Department. Applicants should have sound knowledge of domestic equipment, their construction and materials used therein, together with basic electrical principles. Ability to compile reports essential. Married man preferred, living in greater London. Applications, with full details to
The Principal, Good Housekeeping Institute
28-30 Grosvenor Gardens, London, S.W.1
(H 546p)

REPRESENTATIVE with initiative and ambition required by old-established firm of Electrical Wholesalers in S.W. London. Some experience preferred. Phone Battersea 3334. (H 576)

SALES CORRESPONDENT for Atlas Lighting Division, Thorn Electrical Industries Ltd. Attractive salary, 5-day week, pension scheme. Apply in writing Staff Manager, 105 Judd St, W.C.1. (H 573)

SWITZERLAND. TRANSLATOR required by firm of world-wide repute for preparation of technical articles from German texts. Pensionable post. Application should contain details of age, career to date and salary expected.—Box 3463, Electrical Times. (H 422)

SENIOR TEST ENGINEER is required by The English Electric Company Ltd. for their Whetstone establishment near Leicester, to look after and be responsible for all test plant equipment both mechanical and electrical in a modern engineering works concerned with various development and production projects. Write, giving full details of previous experience and quoting ref. 1300 to Dept. C.P.S., 336/7, Strand, W.C.2. (H 558)

SENIOR DRAUGHTSMEN required for design of 11 kV metalclad switchgear equipment. The position offers good prospects. Superannuation scheme. Five day week, modern factory. Applications giving full particulars of previous experience, qualifications and salary required to the Personnel Manager, South Wales Switchgear Ltd., Blackwood, Mon. (H 540)

SECTION LEADER, Electrical Drawing Office, required by the Steel Company of Wales Limited (Steel Division), Port Talbot.
The successful candidate will be expected to take charge and supervise electrical Draughtsmen, should have experience in heavy industry and be capable of preparing drawings for electrical installations, including the layout of substations and contractor rooms. A knowledge of lighting and communications would be an advantage. Higher National Certificate or equivalent desirable.
Those wishing to apply should write for official Application Form to the Personnel Superintendent, The Steel Company of Wales Limited, P.O. Box No. 3, Port Talbot, Glam. (H 503)

SENIOR AND JUNIOR DRAUGHTSMEN required for switchgear development work. Good salary offered to suitable applicants. Pension scheme available. Apply stating age, salary and full details of technical qualifications and experience to Erskine, Heap and Co., Ltd., Lancashire Switchgear Works, Salford, Manchester 7. (H 570)

STATION ENGINEERS AND STATION ENGINEERS (Mech.) required by Air Ministry at R.A.F. and M.C.A. stations. Minimum qualifications and experience: (a) Ordinary National Certificate in either Electrical or Mechanical Engineering as appropriate or equivalent standard of technical education. (b) Recognised apprenticeship in either electrical and/or mechanical engineering. (c) Three years' responsible engineering employment, preferably on operation and maintenance of mine, factory or workshop plant and services. Duties entirely supervisory and cover installation, operation and maintenance of high and medium voltage distribution systems, electrical installations, diesel and boiler house plant, steam and hot water heating systems and miscellaneous installations, tools and equipment. Station Engineers (Mech.) duties cover mechanical items only. Commencing salary according to age (normally £550 at age 28 or over), qualifications and experience on range £510 to £640. Appointments include liability for service overseas for which special allowance payable in addition to higher salary. Appointments non-pensionable. Only natural born British subjects. Write, giving age, full details of qualifications and experience to E.A. 1564, London Appointments Office, 1-6 Tavistock Sq, W.1, by 29 May, 1954. Only candidates selected for interview will be notified. No original testimonials should be sent. (H 577)

TRANSFORMER ENGINEERS REQUIRED. Salary commensurate with experience and ability. Apply in writing stating age, qualifications and previous experience, to Personnel Manager, Metropolitan-Vickers Electrical Co., Ltd., Trafford Park, Manchester 17. (H 575)

THE WAR OFFICE: require the following tradesmen for service in the Suez Canal Zone. Power Station Electricians; Electricians, Control equipment; Power Linesmen: Wages 156s. 10d. per week, plus 25%; Engine Hands to run I.C. engines used in pumping and power stations: Wages 142s. per week, plus 25%. In addition a F.S. allowance of £2. 5s. per week (single); £4. 18s. per week (married) tax free is payable. Kit allowance £30. Accommodation (generally tented) is free with reasonable charge for food and messing. Families cannot accompany applicants. Staff must undertake to serve 12 months in Canal Zone. Two weeks' leave a year is allowed. Applications to be made to any Employment Exchange, quoting reference O.M.P. 785/54. (H 578)

THE Switchgear Contracts Department of The English Electric Co., Ltd., Stafford, has vacancies for SENIOR ENGINEERS. Applicants should have recognised technical qualifications. A knowledge of modern switchgear and control gear practice, or of the protection and control of HV systems, transformers and generators or large industrial machine drives, is desirable. Drawing office, test or operating experience will be considered an advantage. JUNIOR ENGINEERS with HNC and engineering experience, preferably with a commercial bias, are also required. Please write to Dept. C.P.S., 336/7, Strand, W.C.2, quoting ref. 446F. (H 515)

THE General Electric Co., Ltd., have a vacancy at the Head Office of their Sales Organisation for an ELECTRICAL ENGINEER in the age group 25/30 years, to work on Airport electrification schemes. Applicants should have had an apprenticeship training and be prepared to go Overseas from time to time. Some previous experience in this type of work will be an advantage. Excellent opportunities exist for promotion. Apply in writing quoting reference B.D. giving full particulars of training and experience to the Staff Manager, The General Electric Co. Ltd., Magnet House, Kingsway, London, W.C.2. (H 527)

THE General Electric Co., Ltd., have vacancies in the Head Office of their Sales Organisation for young men who are interested in the commercial application of electric heat to industry and light engineering equipment.
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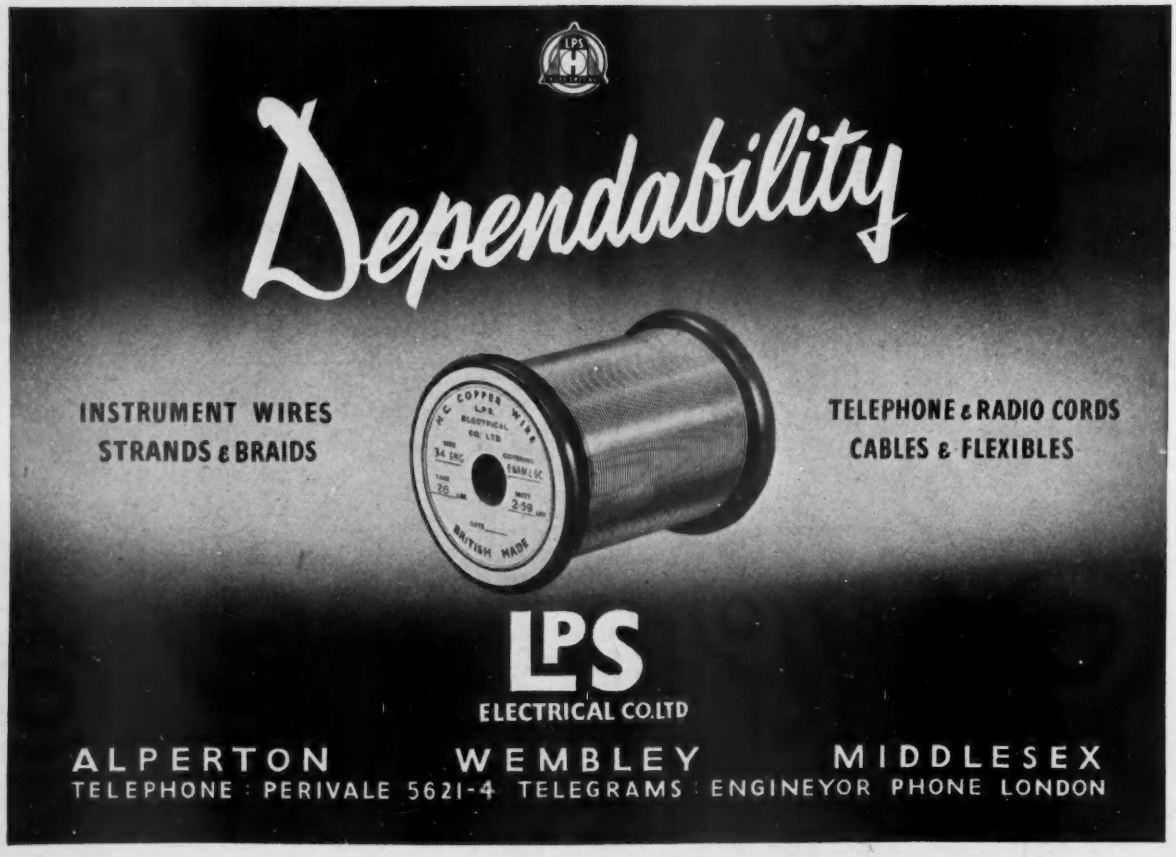

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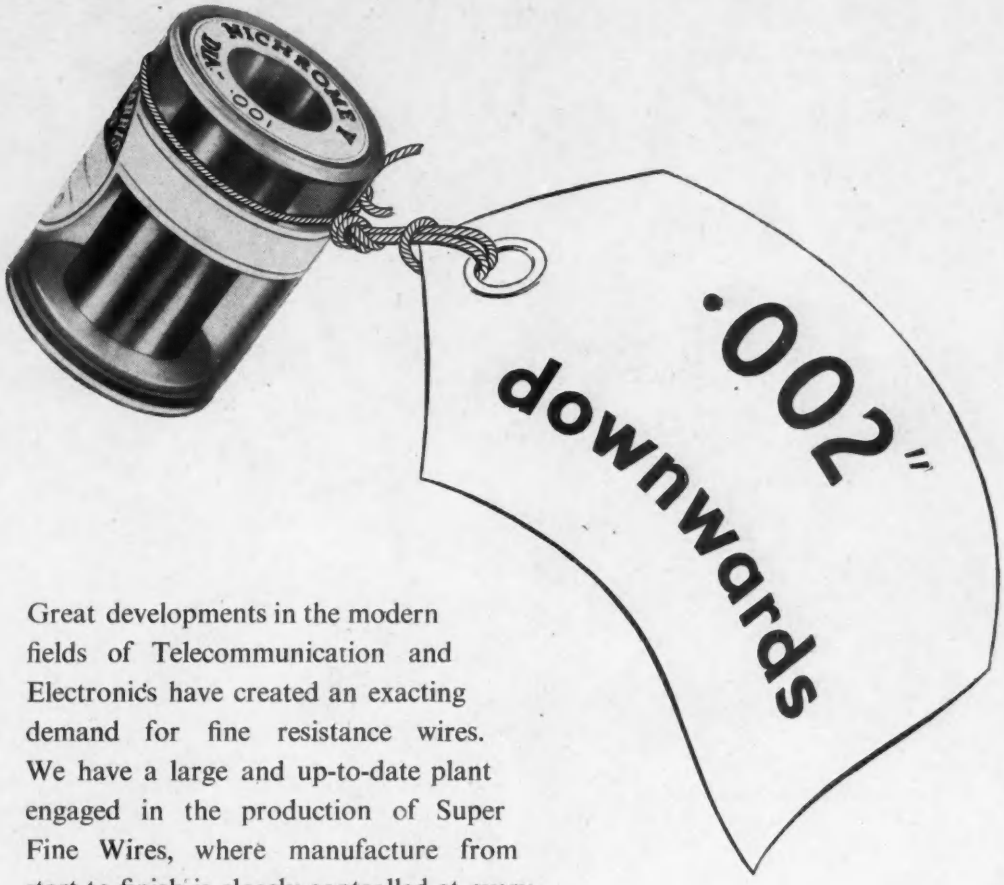

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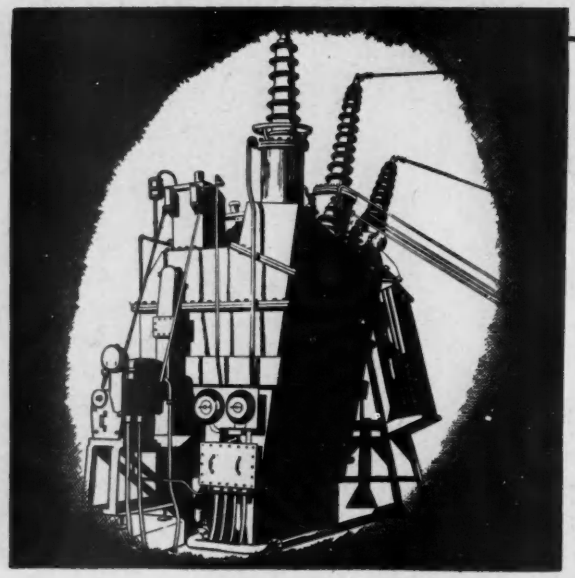

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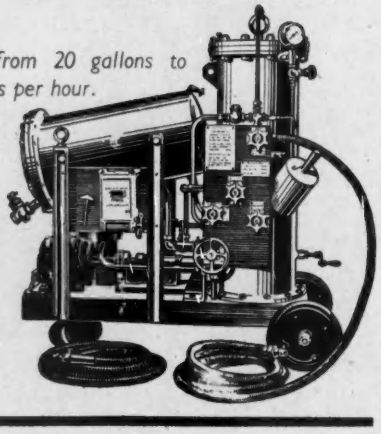

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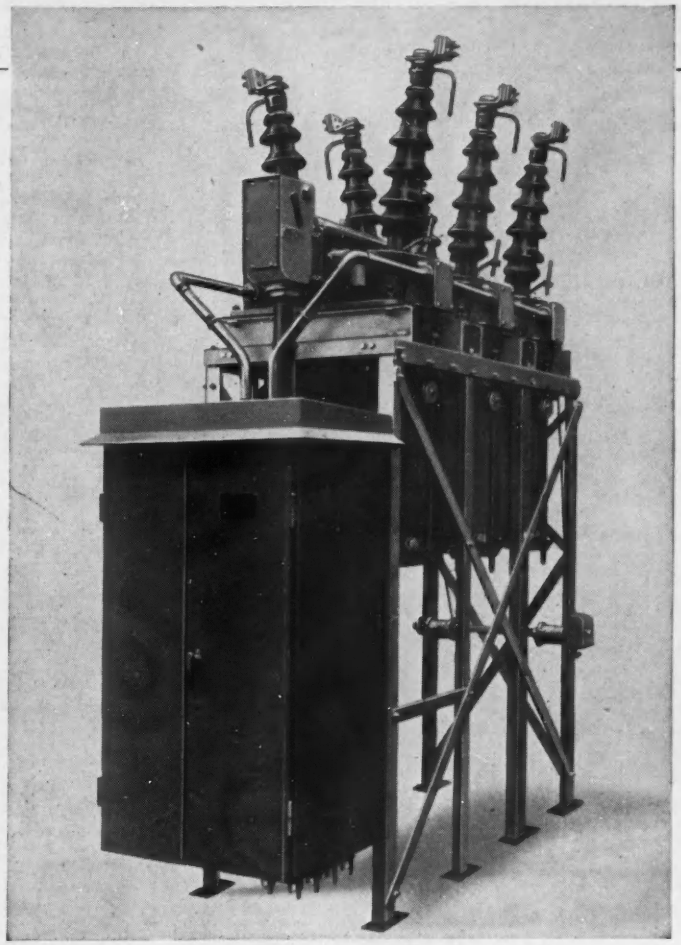

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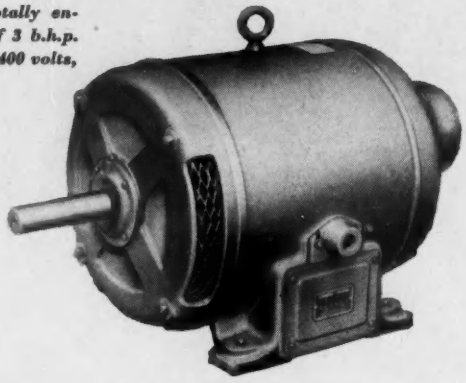

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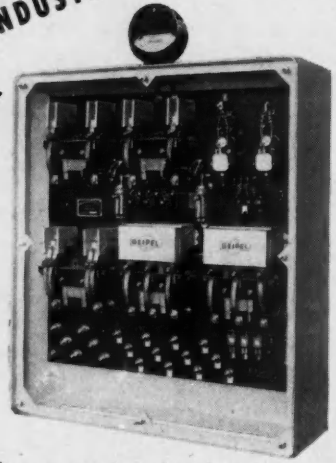

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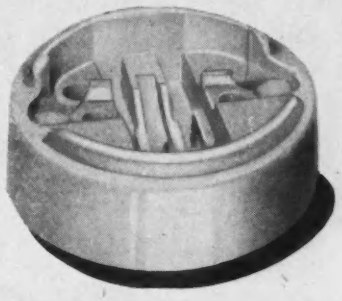

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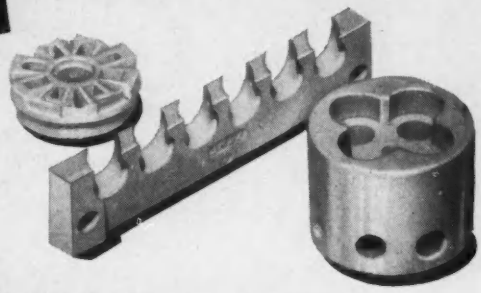

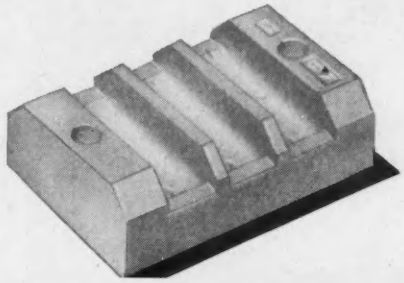

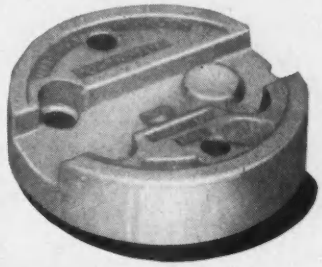

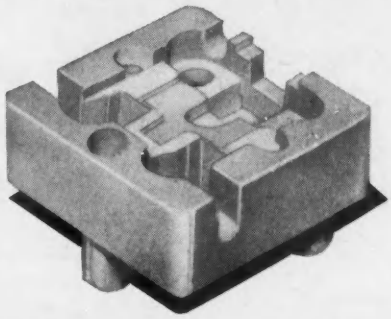

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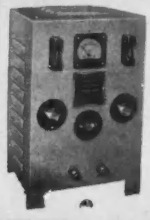

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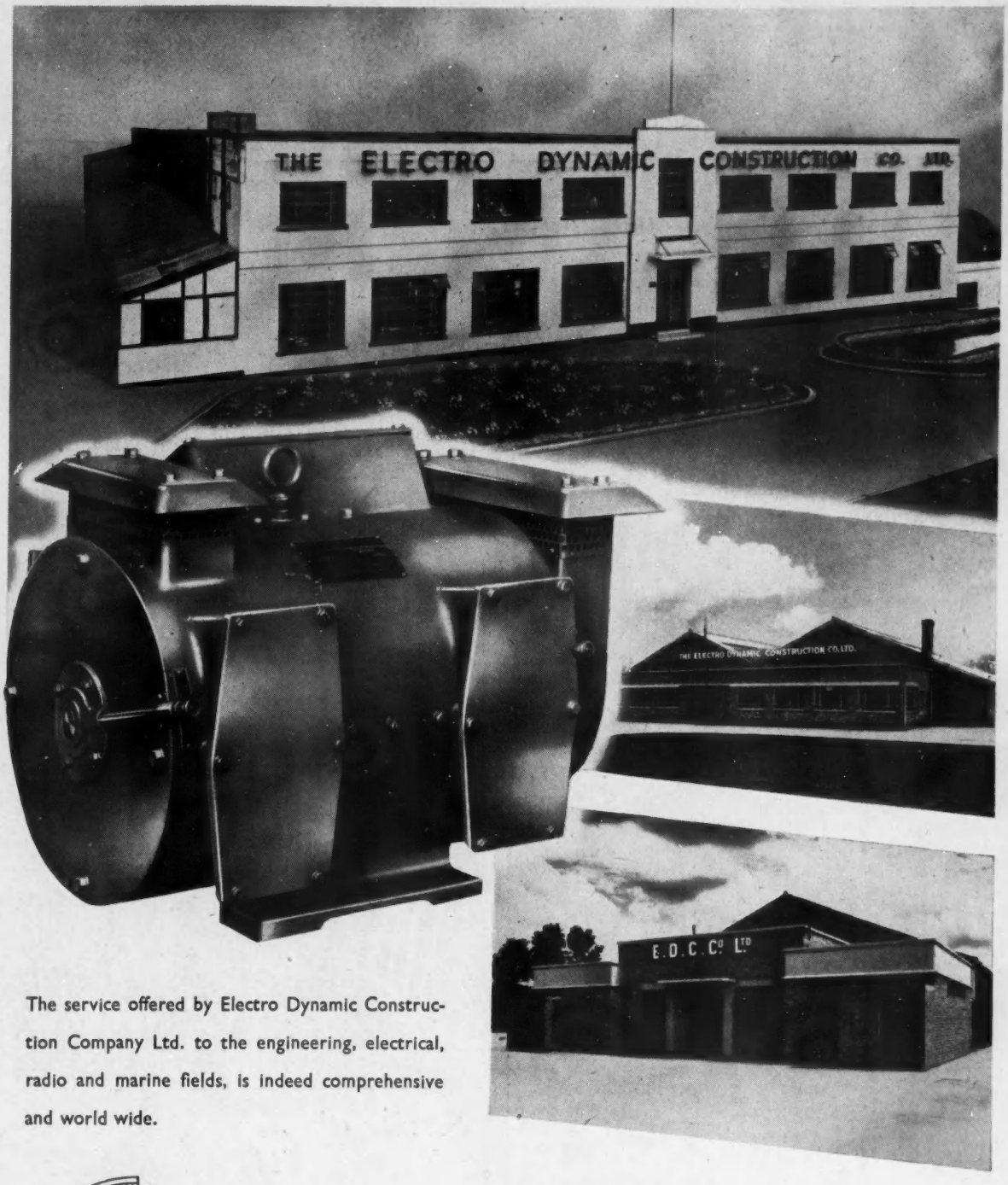

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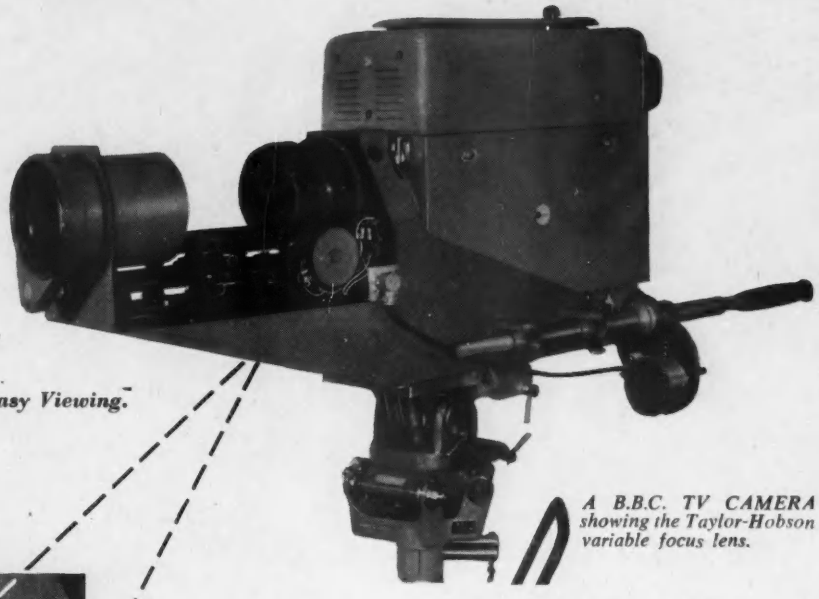
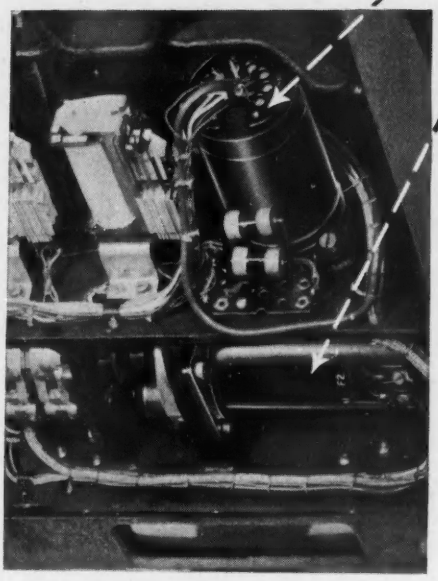


A B.B.C. TV CAMERA showing the Taylor-Hobson variable focus lens.



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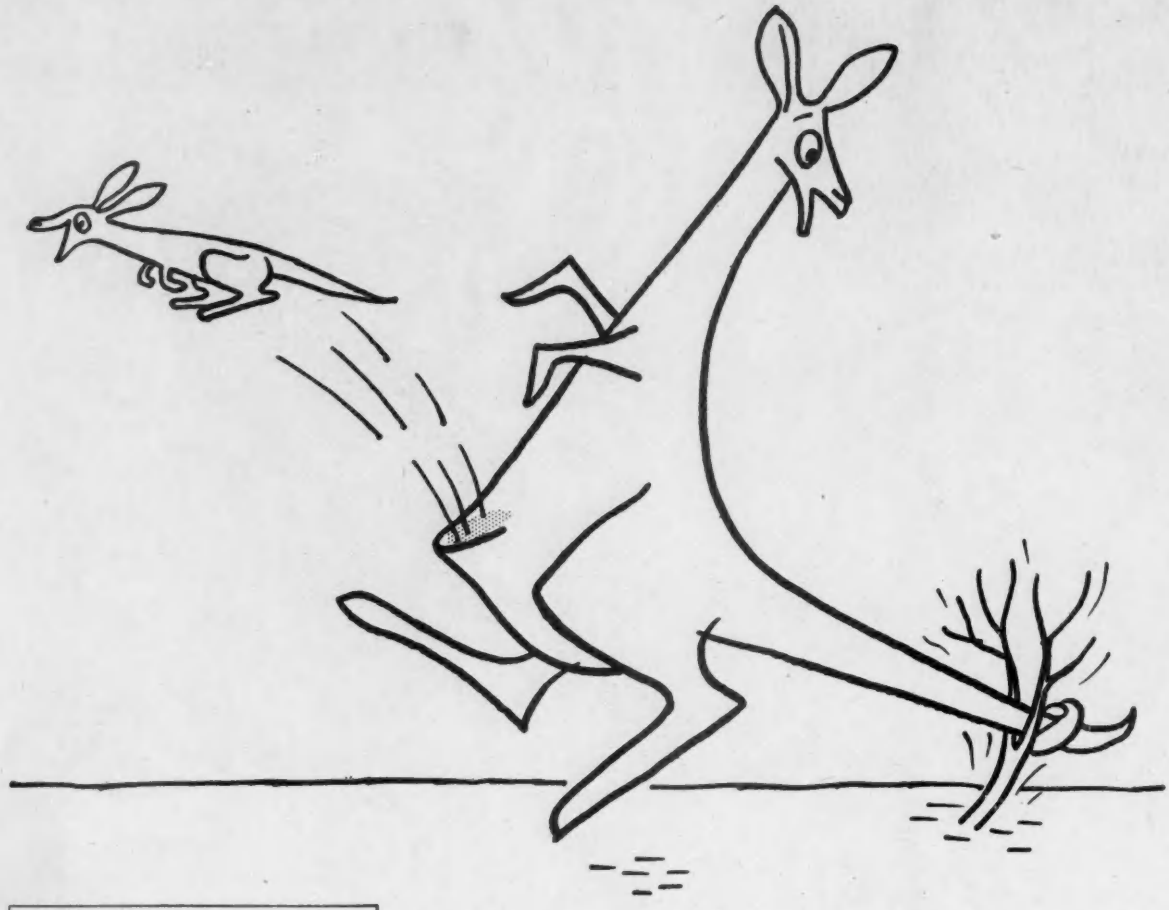

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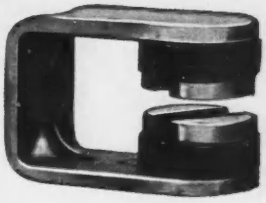

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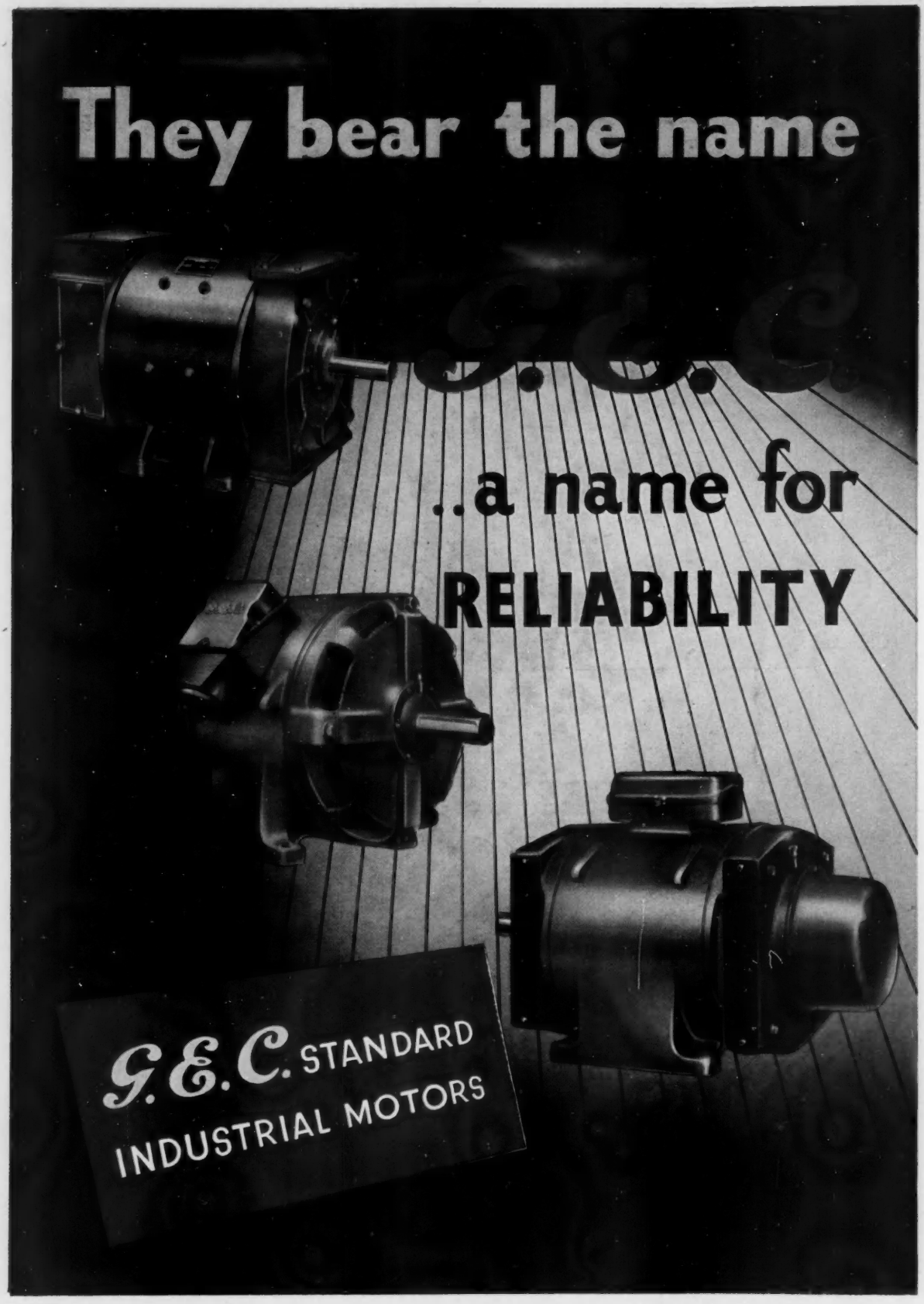

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